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This Week in The IRON AGE

Vol. 153, No. 17 — April 27, 1944

Editorial

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News and Markets

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APRIL 27, 1944

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"You Press the Button - - -"

REMEMBER the slogan that made the Kodak famous? "You press the button, we do the rest."

It was an intriguing slogan. All you were supposed to do was to buy the camera and the film, press the button and let somebody else do the dirty work.

But it didn't work out that way. The Eastman company and the rest of the concerns in that line had so many interesting and attractive gadgets to sell that before you knew it you had a darkroom, an enlarger, developing trays and what have you and were getting your fingers stained with hypo.

Progressive selling, you might call it. Get your foot in the door and pretty soon you can open it wide enough to admit an elephant.

Something similar has happened to us in connection with this war. Consider the steps in sequence.

First: "No American soldier will be called upon to fight on foreign soil."

Second: "Give us the weapons and we will do the rest."

Third: "Give us the weapons and the money and we will finish the job."

Fourth: "Give us the weapons, the money and the men and everything will be hotsy-totsy."

And perhaps, in view of what some of our statesmen have in store for us in the postwar attempt to elevate the backward nations and the antipodes to the American standard, we might add a fifth request:

"Give us the weapons, the tools, the money, the men and your shirts and this world will be a lovely place in which to live."

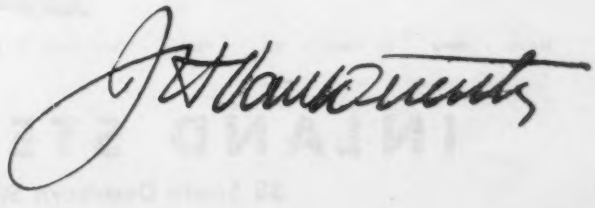
Now that last statement is one with which I cannot agree. To make the world a really lovely place in which to live, you have to have it a place where people are self-supporting and not recipients of charity.

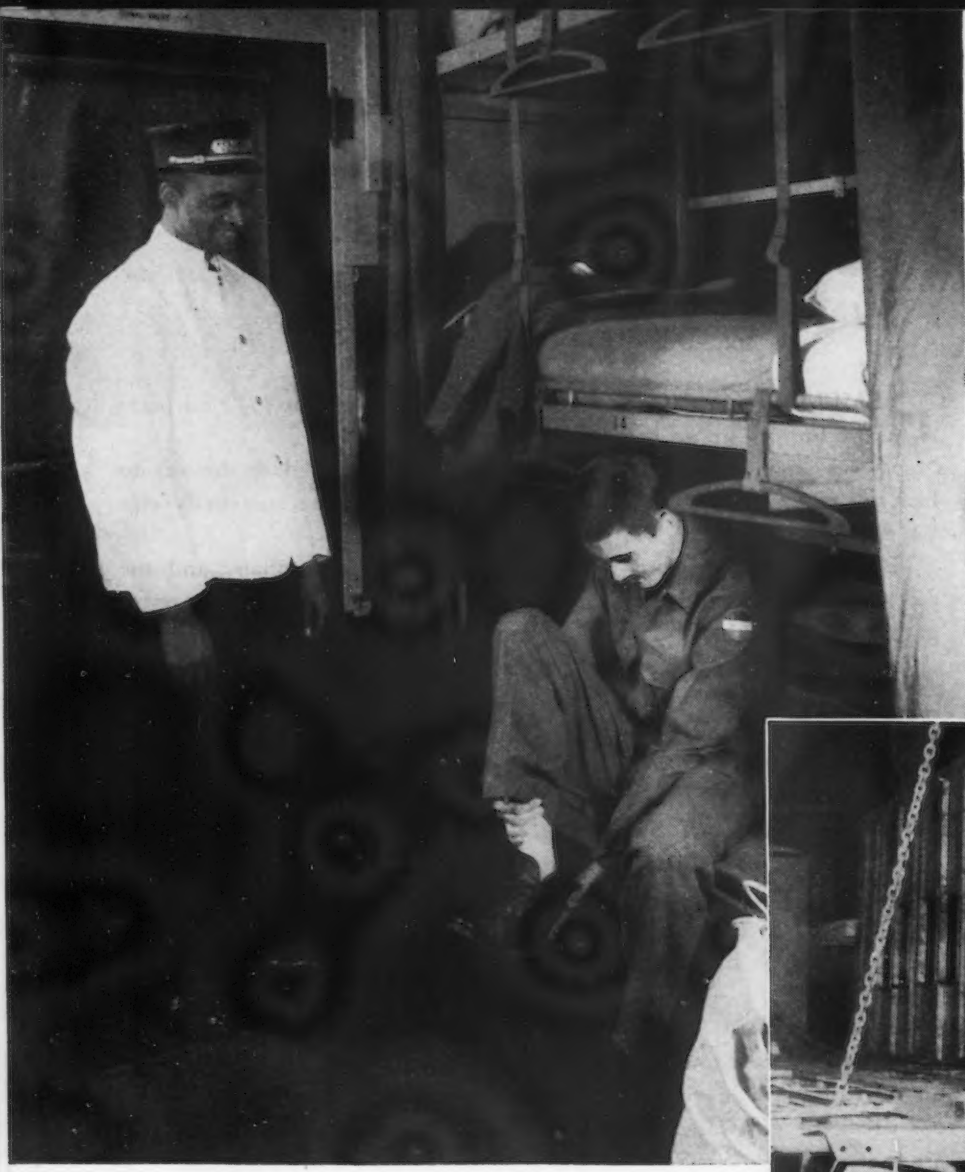
Charity has its place and America is noted for it. That's as it should be.

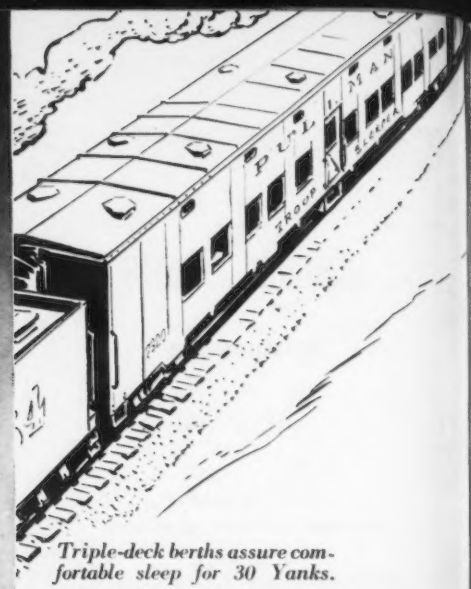
When your neighbor's house burns down, you take him and his family into your home, house them, clothe them and feed them. But you do not execute permanent papers of adoption.

Pastures "over the fence" will always be greenest for politicians as well as for cattle and when world wide visions are exhausted there will always be Mars and Jupiter to tackle. But our boys over there in the four quarters of the world are interested, as most American fathers, mothers, brothers and sisters are, in just one thing. Get the job done and get back home again to the best country in the world.

And God help those who don't keep it so.

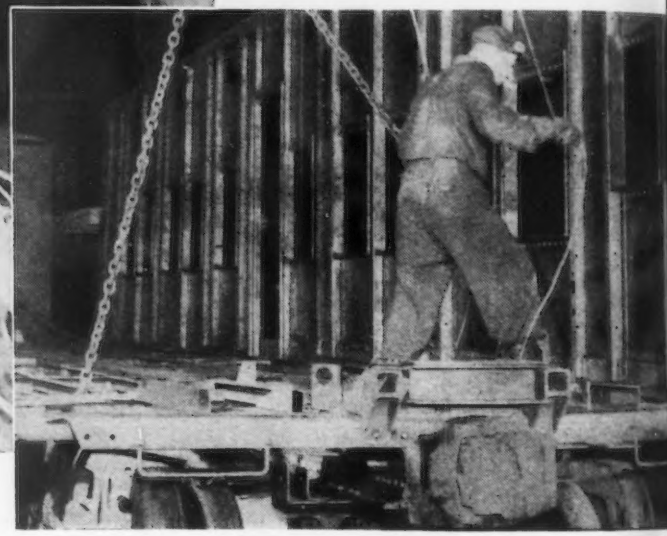






Triple-deck berths assure comfortable sleep for 30 Yanks.

Sub-assemblies speed up the job of building 1,200 new troop sleepers.



Victory Special

Thousands of tons of steel sheets, bars, plates, and shapes, rolled at the great Indiana Harbor Works of Inland Steel Co., are being used by the Pullman-Standard Car Manufacturing Co. in building 1,200 new triple-deck sleepers for the Army.

Each car has 30 berths arranged in tiers. The triple width seats are grouped in sections on one side of the car. For daytime use the top berths remain fixed. The back of the wide, comfortable seat is raised into position for the second berth, and the seat itself forms the lower berth. Each car will have its porter, and a full complement of standard steel bed springs, mattresses, warm blankets, sheets, etc.

These new troop sleepers are another example of the wartime use of steel from Inland—an example of how Inland is helping to bring Victory closer, so that we may again satisfy the peacetime needs of our country.

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The IRON AGE
APRIL 27, 1944

NEWS FRONT

► Very large new orders for 155 mm. and 240 mm. artillery shells have been distributed among steel producers, involving steel consumption double that currently going into all artillery shells.

These orders have been given a priority above everything else, with the exception of LST boats.

► The added emphasis on the 240 mm. size indicates recognition of Italian campaign experience that in certain instances the blitz has disappeared from modern war, to be supplanted by the "quetsch krieg" (squashing war), using heavier and heavier weapons. The American 240 mm. size is the answer to German artillery of about equal caliber.

The recent new orders involve considerable monetary outlay for buildings and forging equipment at National Tube, Tennessee C.I. & RR., and Bethlehem, to be supplied by Army Ordnance.

Weirton, J. & L., and perhaps Colorado F. & I. Co. and Inland will also likely produce these forgings. Participation of these companies is of particular interest as forging has not been their forte.

► Pressure for LST boats continues unabated. To speed output numerous time-consuming inspections above engine level and extensive trial runs have been abandoned.

► This country now has six cupola pre-melting installations to supply hot metal to open hearths and electric furnaces. Operating data indicate that these arrangements so far offer little if any reduced costs of metallics to the non-integrated ingot producers.

► Recent experiments with coal and fuel oil mixtures (8 to 10 per cent coal) indicate a fuel of considerable promise for open hearth use, both now and in the postwar period.

► A recently captured Junkers 88 German bomber revealed that external bomb racks attached to wings are held on by hollow, explosive filled bolts. In case of fighter attack, the pilot has only to press a button, thereby igniting the explosive which blows the bombs and racks loose from the ship.

► At the AT&T annual meeting last week, representatives of organized labor garnered some proxies and nominated labor members to the board of directors. They were overwhelmingly outvoted. Later, two resolutions were offered by the labor representatives, which again were outvoted. However, this may be the beginning of a trend on the part of labor to obtain a voice in management.

► Dodge Chicago, the nation's largest aircraft engine plant, is slowly getting into production of 2200 hp. Wright engines for the B-29. Lack of labor and the need for training most employees from scratch is the chief holdup. Employment has just passed 23,000--60 per cent of the 1944 quota.

► British views concerning postwar airways were expressed this week by a British Overseas Airways representative who said Great Britain was interested only in local colony service in the Pacific but its huge investments in South America means that Britain will have to insist on being a major air factor in that area.

► WLB, WMC, the War and Navy Departments and the Maritime Commission are now training their guns on the so-called engineering services which render little, if any, engineering service but actually serve as labor brokers. Regulating agencies are putting teeth in rules and buying agencies will hit companies with contract cancellations and disallowance of expenses in renegotiation.

► Small manufacturers of farm equipment are loud in their criticism of arbitrary steel allotments. Focal point of this resentment is the reported allotment to Ford-Ferguson of steel to manufacture 25,000 tractors.

► With the Geneva plate mill scheduled to roll 10,000 tons of ship plates in April and 20,000 in May plus output of the Kaiser Fontana mill, substantial tonnage of plates used by West Coast shipbuilders will be produced west of the Rockies.

Nodulizing Iron Ore

. . . Although nodulizing in rotary kilns has been little used for the preparation of iron ore as compared to sintering, this method has certain advantages over the static process of partial fusion. A comparison of operations and costs and suggestions for improved results from rotary kilns are herein presented.

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By GILBERT E. SEIL
Day & Zimmermann, Inc., Philadelphia

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TWO methods of partial fusion are employed to convert finely divided ore into larger pieces for blast furnace and open hearth use. One is a static method, sintering, in which there is no relative movement between the charge and the equipment in which the partial fusion takes place. The other method, nodulizing, causes a real and continuous relative movement between the charge and the rotary equipment.

It is the relative movement which differentiates nodulizing from sintering, since the controlled movement between the ore and the nodulizing equipment controls the shape of the finished particle. In other words, the relative movement, the thickness of the bed and the temperature gradient determine the size, physical characteristics and the shape of the nodules.

In comparison to the amount of ore that has been sintered, the amount that has been nodulized has been exceedingly small. Although nodulizing was started in the United States as early as 1904, the rotary kilns then used differed greatly from modern kilns in size, in instrumentation, in gas velocity controls, in constant B.t.u. input, flame direction, prevention of scale and prevention of mud rings. The improvements in the rotary kiln equipment are primarily in design and in methods of operation.

In 1904 both the Illinois Steel Co. at South Chicago and the Pennsylvania Steel Co. (now the Bethlehem Steel Co., Steelton, Pa.) built rotary kilns for nodulizing furnace flue dust. These kilns were about 6 ft. in diameter and 60 ft. long.

Later the Pennsylvania Steel Co. built a larger plant at Lebanon, Pa., for nodulizing Cornwall ore concentrates. These kilns were 7½ to 8 ft. in diameter and 100 ft. long. Again, in 1909 Pennsylvania Steel built a 12-kiln plant in Felton, Oriente Province, in Cuba, to nodulize the extremely fine Mayari ore. These kilns, 10 ft. in diameter and 130 ft. long, are still in use, although idle at the present time. Currently, the Universal Atlas Cement Co. (a subsidiary of the United States Steel Corp.) is nodulizing iron ore for the Corporation, and the Federal Portland Cement Co. at Buffalo is doing a similar job for Bethlehem—both in rotary kilns. The product of these operations is largely used as charge ore for the open hearth furnace, although at times large amounts were used for blast furnace charge. The Allentown Portland Cement Co., at its West Conshohocken plant, has just completed nodulizing over 100,000 tons of precipitated iron oxide, and has produced a satisfactory nodule of highly desirable physical characteristics. The product of this operation was used by the Sparrows Point plant of Bethlehem Steel Co., largely as charge ore for the open hearth furnace.

Comparable Processing

Floated manganese dioxide ore is being nodulized by the Cuban American Mining Co. at Cristo, Oriente Province, Cuba, and floated manganese carbonate (rhodochrosite) is being nodulized by the Anaconda Copper Mining Co., Butte, Mont. At Las Vegas, Nev., the Manganese Ore Corp. is nodulizing manganese oxide from a manganese sulphate to a satisfactory product. These operations are furnishing a most satisfactory nodule for blast furnace and open hearth use. In many other fields similar nodulizing is being done. The cement industry is by far the largest users of rotary kilns, the product of which the cement industry calls clinker.

The Westvaco Chlorine Products Corp. at Newark, Cal., and the Kaiser Co. at Permanente, Cal., are nodulizing magnesia recovered from sea water, as a synthetic dead-burnt magnesium oxide for the refractory industry.

The Michigan Chemical Co. at St. Louis, Mich., is nodulizing magnesia, recovered from brines, in a rotary kiln.

The Harbison-Walker Refractories Co. has recently built and is operating a relatively large plant for the recovery of magnesia from sea water, and is nodulizing the magnesia so recovered, in a rotary kiln. The company also operates rotary kilns at

Cheweelah, Wash., to nodulize mined magnesite.

Many chemical companies use rotary kilns for nodulizing and for causing reactions to take place between various chemicals. An example of the chemical uses is the manufacture of chromates from chrome ore, lime and soda ash by several companies in this country and abroad.

Rotary kilns are used extensively in the alumina industry.

Many dolomite products are prepared in rotary kilns. Basic Dolomite, Canadian Refractories, Standard Lime & Stone of Baltimore and several others are using rotary kilns for preparing dolomite and dolomite mixtures for use in the open hearth furnace. In addition to this list, there are several installations in Europe in which iron ores are being nodulized. In the past 30 years, at least 25 rotary kilns have been installed for nodulizing blast furnace flue dust and mixtures of blast furnace flue dust and iron ore that vary in size from 55 to 500 tons per day.

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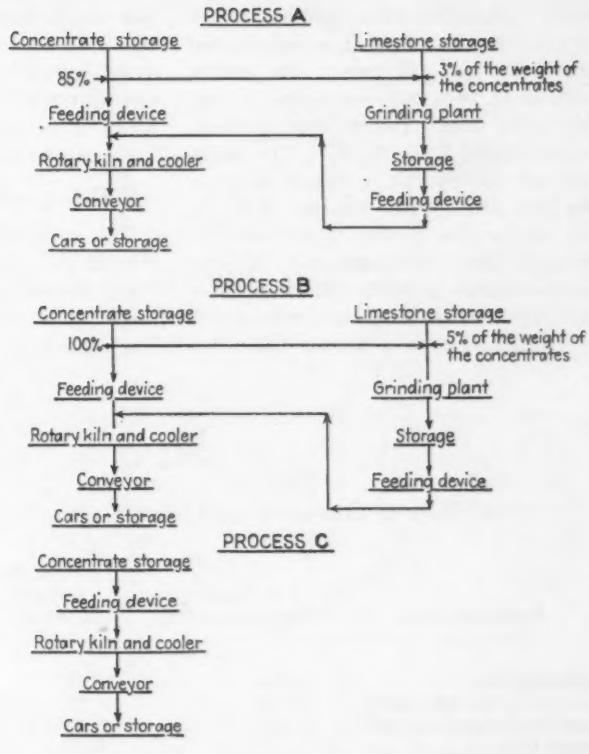

FIG. 1. Flow sheet showing three methods for nodulizing iron ore. Processes "A" and "B" use limestone while Process "C" utilizes no additions.

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Rotary Kiln Nodulizing Plant

The sintering plant consists of a pan or a series of pallets equipped with a grate bottom, a method of drawing air down through the grate and an igniting system. This portion of the plant corresponds to the rotary kiln in a nodulizing system. The rotary kiln is a refractory lined tube which rotates on tires and rollers about its longitudinal axis. The sintering plant requires preparation equipment in which the fine ore and solid fuel can be dried and thoroughly mixed and then properly moistened so that when the charge is placed on the grate it is sufficiently open for the air to be uniformly drawn down through it. It also requires equipment at the discharge end so that the fines can be separated for recycling from the acceptable material in the partially cooled clinker.

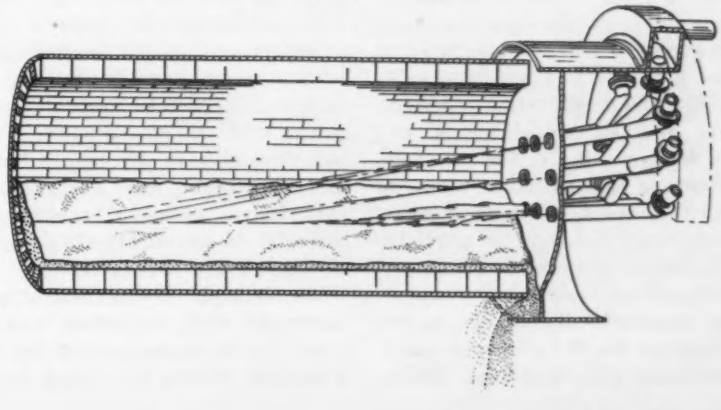
In the rotary kiln, conveying equipment is necessary for charging the ore into the rotary kiln at a controlled and fixed rate. The product leaving the rotary kiln is a finished product, requires no separation, but only conveying equipment to move it either into the stockpile or into the cars.

The flow sheet for a sintering plant is somewhat more complicated than a flow sheet for a rotary kiln nodulizing plant. The charge that goes into an individual pan or pallet determines the product which leaves that equipment. Inequality from pan to pan or from hour to hour in the charge shows definitely in the discharge of the sintering machine. In the rotary kiln it is important to keep the charge of the ore relatively constant. Even this does not mean constant for every minute or every 5 min., since the rotary kiln is a truly continuous process and slight inequalities in the feed actually are compensated for in the first portion of the kiln which acts as a conveyor and a drier or preheater and as such equalizes the charging rate if it is constant within reasonable cycles.

In the sintering plant, after the charge has been placed on the grate, the fuel in the charge is ignited by a gas flame or a liquid fuel flame which impinges upon the upper surface of the charge. Suction under the grate causes the flame to penetrate the charge until the temperature is sufficiently high for the fuel to ignite and also causes air to flow down through the charge at least until the fuel is completely consumed. When the fuel is properly calculated and added the generated heat is sufficient to sinter the mass into clusters of ore. The charge is then gradually cooled, dumped and screened. The fines from 10 per cent up are returned to the process as raw mix and serve to open the charge. Sometimes a coarser portion of the fines is separated and is placed on the grates to protect them from burning.

In the rotary kiln the fuel is not mixed with the ore, although it is advantageous to mix 1 to 5 per cent of coal or coke with the charge as it is fed into the rotary kiln. The feed coal or coke as it burns preheats the charge, causing nodules to form earlier, and results in a general improvement in performance and in increased output. It is also advantageous in that it reduces some metallic oxides, like zinc oxide, to metals and aids in volatilizing zinc. It also re-

FIG. 2. Shown above are directional flames from a multiple burner arrangement striking the charge.



duces sulphates to sulphides which oxidize to SO_2 and are eliminated from the ore. However, the major portion of the fuel enters the kiln at the point where the finished product is discharged from the kiln. The products of combustion passing through the kiln preheat the charge. The air for combustion passes either over or through the discharge and is preheated before it enters the kiln. The amount of fuel must be accurately controlled since a constant temperature at a predetermined zone must be maintained.

The type of material to be nodulized determines the necessary equipment for feeding the kiln and also determines the type of kiln to be used. If the fine material is exceedingly small in particle size, it may be advantageous to make a slurry of it and feed it into a kiln which was designed for the evaporation of large amounts of water, such as a wet process cement kiln. If the ore fines are coarser so that grinding would be required to make a slurry, it is preferable to feed the dry or partially dry, relatively coarse ore to the rotary kiln without the addition of water. Feeding relatively dry charge to the kiln decreases the B.t.u. requirements for nodulizing and, therefore, lowers the cost to some extent. This does not mean that the fine ore must be dried before it enters the kiln, since the first portion of the kiln acts as a drier. Any additions, such as coal or lime, can be made in the dry state.

Sintering and Nodulizing Charges

The rotary kiln has the advantage that it can take as feed either very finely divided material or very coarse material. It can be either wet or dry. The sintering machine requires relatively dry material and relatively coarse material. It is necessary to properly moisten the charge material to the sintering machine to keep it open. Excessive moisture in the sintering machine charge will seriously interfere with the sintering operation.

In the rotary kiln there is no need to return any of the finished product to the process, while in the static process it is necessary to protect the grates with the coarse material which has already been through the process and to use the finer return to keep the charge open. Exceedingly fine material is practically impossible to use as a static process feed.

An example of the difficulties encountered with the static process is found in the experience of the Cuban American Mining Co. which installed a continuous sintering process to treat floated manganese dioxide ores. The plant was exceedingly difficult to operate. It did not yield a uniform product and the product which it did yield was not satisfactory, at least to some purchasers. The difficulty with the process was that the charge of fine materials cracked, and the cracks were channels through which the air could travel easily. This caused shell formation, leaving a large particle with a well fused shell, but a finely powdered center. A rotary kiln installation replaced the sintering machine and yield a satisfactory product. Similar sintering machines have been considered and investigated by such companies as the Anaconda Copper Mining Co. and the Manganese Ore Co. for sintering fine ores, but after careful investigation rotary kiln installations were finally chosen.

The sintered product is neither uniform in size, in shape nor in toughness. It has a cluster-like structure. Although it appears to be satisfactory going into the blast furnace, unless it is properly sintered it does not stand the rubbing and pressure of the burden as well as do nodules from a rotary kiln. The rotary kiln nodule is almost round, has a uniform hardness throughout and uniform apparent density. It can be manufactured to meet reasonable screen test specifications and has several advantages over sinter, particularly in that it does not form fines in the blast furnace.

Another important consideration is porosity, since the porosity of sinter varies in all degrees while the porosity of nodules is quite uniform. It might be well at this point to discuss porosity as a set percentage of porosity in one material may not have anything to do with the same percentage of porosity in another material. For example, a particle having a volume of 100 cu. in. and 30 per cent porosity, or 30 cu. in. of pores, can have one large pore, placed anywhere within the 100 cu. in. The effect of moving the pore from one place to another has real effect on the physical strength and reactivity of the original 100 cu. in. This same 100 cu. in. having 30 per cent porosity can contain 30 pores, each 1 cu. in. in volume. The position of these pores, their shape and whether or not they are connected cause real differences in the property of the 100 cu. in. particle. With the same 100 cu. in. it is possible to have a million or a billion pores, the volume of which will still

TABLE I

Breakdown of Estimated Nodulizing Cost in Cents a Gross Ton

Production Rate	Full Capacity, 2000 Tons a Day	50 Per Cent Capacity, 1000 Tons a Day	25 Per Cent Capacity, 500 Tons a Day
Operating labor	8.64	17.28	34.56
Stockpiling and car loading	3.25	6.50	13.00
Maintenance and supplies	4.00	5.00	6.00
Repair labor	4.00	5.00	6.00
Fuel	50.00	50.00	50.00
Power	6.50	8.00	9.00
Social security and compensation taxes	2.00	3.60	6.90
	78.39	95.38	125.46
Overhead—plant, laboratory and office	3.75	7.50	15.00
Depreciation	5.00	10.00	20.00
	8.75	17.50	35.00
Total cost	87.14	112.88	160.46

NOTE: The important factor in the nodulizing costs is the divisor, or tonnage produced per day. The only item which remains constant is the fuel per ton. Each other item is reduced as the tonnage per day increases. A similar comparison holds for sintering operation.
(1) This estimate is made on the assumption that the kilns run 100 per cent of the time.
(2) No allowance has been made for idle plant expense.
(3) No allowances have been made for contingencies.
(4) The figures represent costs on a plant specifically designed for the nodulization of a particular type of ore.
(5) The following items have not been estimated in the costs: (a) Demand charge for power; (b) local taxes; (c) water supply; and (d) general maintenance of buildings.

be 30 cu. in. It is, therefore, important when discussing porosity to discuss the size, shape, distribution and whether or not the pores are connected.

Operation Costs

On the same scale and under the same conditions of production, the cost of nodulizing compares favorably with sintering, provided that economic units are employed and that labor and equipment are used to their maximum capacities. To emphasize this point, Table I shows the change in estimated nodulizing cost when a plant, having coordinated equipment all of which is capable of operating at the rate of 2000 gross tons a day, operates under full capacity, under half capacity, and under one-quarter capacity. The required equipment consists of either two, three, or more kilns, depending upon their size, one crane for loading and unloading, one locomotive for shifting, and other auxiliary equipment capable of handling 2000 tons a day.

Assuming that the plant has four kilns each with a capacity of 500 tons of nodules per day, and assuming that when one, two or four kilns are used each kiln is used at its economic capacity and that no kiln is ever used under this capacity, then the operating labor will decrease inversely with the tonnage produced, since it requires the same number of men to operate one, two, three or four kilns. This statement is approximately true in general and exactly true if the proper mechanical equipment is installed, since it only takes one man to operate the crane and one man to operate the kiln or kilns whether 500 tons, 1000 tons, or 2000 tons are produced in a day. The stockpiling and car loading come under the same classification since a locomotive or a crane is required 24 hr. a day no matter how much work the crane has to do. For car loading a locomotive is required and the locomotive can spot and move 10 cars or 40 cars a day with the same labor. Fuel, on the other hand, varies with the tonnage directly, since a definite amount of fuel is required for each ton of material produced, provided that the kilns are individually operated at maximum fuel efficiency. Maintenance and supply, power, repair and labor decrease with large tonnages, but not in proportion to the tonnage. Overhead and depreciation are figured as a set amount and the tonnage is the divisor which determines how much is charged off to each ton of finished product.

Cost is a vital factor in the preparation of finely divided ores for the steel industry, and this tabulation indicates that the divisor which can be attained in a rotary kiln plant determines the economics of the operation. Therefore, it is advisable to operate plants utilized for this purpose at their maximum rate of production. The capacity of a rotary cement kiln for the production of iron ore nodules is at least three times its capacity for the production of cement clinker.

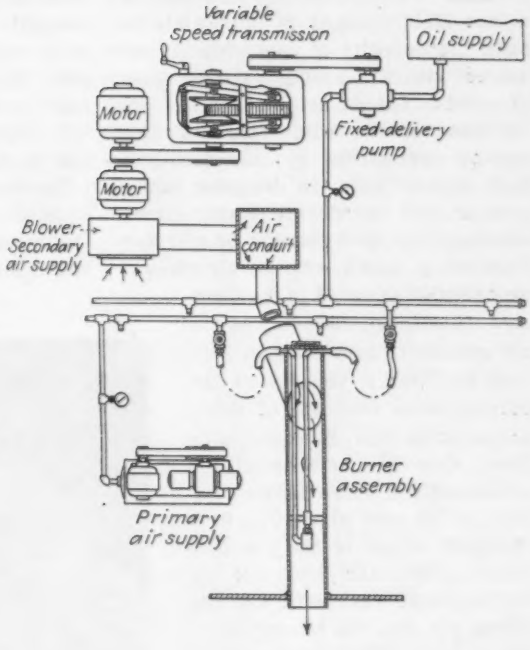


FIG. 3. System for constant B.t.u. input by which a fixed volume of oil is fed to the kiln each second, independent of the pressure required to force the oil through the burners. All the valves are either completely closed or completely open. If one burner becomes slightly clogged, the others must take the amount of oil which the clogged burner does not. The only effect upon the system is that the pressure increases. This can be seen on the small telltale gage.

Conditions Affecting Rotary Kiln Operation

Although several companies have tried to use rotary kilns for nodulizing finely divided iron ores, many of them have encountered serious difficulties, partly because of the kiln operators employed, and partly because the fundamental principles under which rotary kilns operate were not understood at the time. As a matter of fact, even today the kiln manufacturers do not agree as to the capacity of a certain size kiln. The reason for the disagreement is that the use of various type burners and various types of product coolers or air preheaters determine the rate of B.t.u. liberation. Usually the fuel system and the burning system were so designed that it was impossible to keep a constant B.t.u. input. By constant is meant second to second control of B.t.u. input. Even with a constant B.t.u. input, a set amount of fuel per second is not the combustion answer. The fuel must be so fed to the kiln that it burns with a flame which does not fluctuate and which does not surge in the kiln. If the flame surges then the hot zone in the kiln surges and the "curse" of the rotary kiln starts. The "curse" is the formation of a ring in the kiln which reduces the capacity, interferes with the combustion, and throws the kiln out of balance. It must, therefore, be removed.

Most kilns are operated with single burners and for certain purposes this

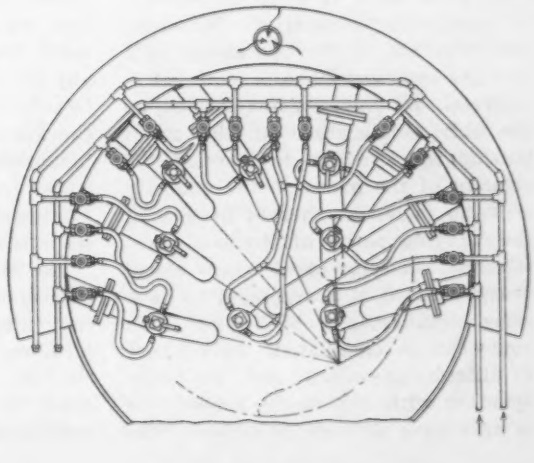


FIG. 4. Low pressure manifold to which the secondary air tubes are connected. Also shown here is the oil and high pressure primary air manifold.

is ideal. For nodulizing, however, it is not ideal since it is impossible to burn the quantity of fuel which is required without causing various rates of combustion at set distances from the hood of the kiln. This difficulty can be exemplified by considering a fuel stream ¼ in. in diameter being comminuted or disintegrated either mechanically, or by steam or air, and then being mixed with an air stream probably 42 in. or 48 in. in diameter. The large diameter of the air stream is necessary to prevent too high a velocity at the burner, since the rate of flame propagation must be equal to or lower than the velocity of the combustible mixture before combustion can take place. The first chemical action is the reaction between the outer portion of the disintegrated fuel with the adjacent air and the liberation of some heat. The products of combustion of the first portion of the fuel diffuse into the rest of the air, decreasing the oxygen concentration, and thereby decreasing the rate of chemical reaction so that the flame has traveled 60 ft. to 70 ft. up into the kiln before the combustion is nearly completed. At times a certain amount of uncombined fuel and more than enough oxygen to combine with it leave the kiln in such a diffuse or dilute concentration that the chemical reactions cannot be completed.

Besides controlling the B.t.u. input, it is necessary to control accurately the feed to the kiln, particularly the solids, since the amount of water which enters the kiln is not serious within limits. By limits is meant a relatively small variation in percentage of water for a given set of conditions. If a relatively dry feed is used to the rotary kiln, then the variation between 3 to 5 per cent water is almost immaterial. If a slurry feed is used, a variation of 30 to 32 per cent is relatively immaterial. However, the difference in the operations at 3 to 5 per cent and 30 to 32 per cent is material. Its only action is to change the exit temperature of the gases leaving the kiln and to increase the velocity of the gases as the quantity of water increases, thereby increasing the carrying power of the exit gases for dust. In some cases where a wet charge is used, it is necessary to have some arrangement by which mud rings can be eliminated. This is not a difficult operation and any kiln operator with experience knows how to take care of such situations. The velocity of the flame or flames, the amount of preheated primary air and of secondary air which is used in the kiln, the speed of the kiln, the draft, and the thickness of the charge in the kiln determine the efficiency of the kiln operation.

In controlling the B.t.u. input, the equipment for control is important. On most kilns if too much fuel is added and the fuel is cut too much, it is impossible to go back between the first point and the second point since there is no indicator on the fuel system to distinguish the two points. Also, it cannot be determined whether the fuel is cut back to the desired point or to some other point. An indicator is, therefore, necessary on the fuel installation to tell exactly how much fuel is being used per minute at any given minute. An indicator must be used on the kiln feed which records the amount of solids fed to the kiln independent of volatiles, such as water and decomposition products. Equipment of this type is included in modern rotary kiln installations.

The kiln speed is important since it determines the length of time that the charge is in the kiln and also determines the thickness of the bed in the kiln. The thickness of the bed has much to do with the density of the individual nodules and with their size.

FIG. 5. Hood of a kiln in which chrome ore is being nodulized.

In the operation of a rotary kiln it is necessary, as in all other industrial furnaces, to recover all of the normally lost heat possible. It is, therefore, advisable to recover the heat from the nodules leaving the kiln by passing air which enters the kiln over or through the nodules. Another source of recoverable heat, which varies considerably with the type and thickness of lining, is the heat radiated from the first 30 ft. of a rotary kiln. A covering hood, placed over this portion of the kiln so that the air must pass between the kiln shell and the hood and from the hood through a fan to the air preheater where the nodules are cooled, conserves B.t.u.'s and is a real factor in the economics of nodulizing, since the biggest item in nodulizing cost is the fuel.

In the operation of rotary kilns it is necessary to consider three factors as far as thermal capacity of the kiln is concerned. Since the production capacity of the kiln depends upon its thermal capacities, there are several questions which must be answered before the economics of a single kiln can be determined. In order of their importance they are:

(1) Rate of B.t.u. liberation in the heating zone.

(2) Rate of B.t.u. absorption by the charge in the heating zone.

(3) Allowable maximum temperature of the charge.

Before these three factors are considered it is necessary to differentiate between temperature and B.t.u. liberation. It is possible to liberate any number of B.t.u.'s per sec. at any kiln temperature within limits. The temperature is a measure of the number of B.t.u's per unit of space. The characteristics of the material in the space must be considered as well as the B.t.u. concentration since the heat capacities of the materials vary. In other words, the specific heat is also an important characteristic of the material in the space.

Under the rate of B.t.u. liberation in the heating zone, the following considerations are important:

(a) The space in the kiln available for B.t.u. liberation, to some extent, is determined by the shape of the flame and by the number of flames. Since there is a fixed B.t.u. liberation per cu. ft. of space per unit of time under a given set of conditions, the change of temperature and pressure

also change the rate of B.t.u. liberation for that space.

(b) Direction of the flame determines whether the flame impinges on the charge and at what angle. If there is impingement, then velocity is changed to a pressure at that point and the B.t.u. liberation is increased. The flame is forced into the voids in the charge, and the B.t.u.'s are liberated directly into the charge. If the flame impinges on the charge, the flame will continue adjacent to the charge for a relatively long period and, until the combustion is complete, the emissivity of the flame will be high.

(c) In most rotary kiln, operations, it is necessary to have absolute control of the rate of combustion. It makes no difference what the direction of the flame is or the number of flames, if the rate at which fuel is fed to the kiln varies from sec. to sec., difficulties may be expected. It is essential that the fuel be fed to the combustion system at an exceedingly uniform rate.

(d) The method of mixing the air with the fuel partially controls the temperature of the gaseous mixture in the flame. The velocity of the primary air with the fuel and the way in which the secondary air meets the fuel, mixed with the primary air, is important. There are so many variations that it is impossible to describe them all, but it is possible to give one or two examples. If the primary air and secondary air are traveling at a velocity higher than the rate of flame propagation under the existing conditions, combustion will not start until the velocity of the combustible mixture has been reduced to at least the rate of flame propagation. If at this point there is not sufficient oxygen for complete combustion, a gaseous fuel is produced which continues to burn as more oxygen is supplied from the secondary air. Therefore, the velocity of the secondary air and the manner of admission to the kiln is important.

(e) Since the B.t.u. liberation depends upon the rate at which fuel can be burned, changing from one type of kiln to another type of kiln, or from one type of fuel oil to another type of fuel oil makes a real difference in both the rate at which B.t.u.'s are liberated and the location of the liberation. Chemical analysis of the fuel has nothing to do with the rate of flame propagation or the ignition velocity of the fuel. It is interesting to note that methane burns very slowly; ethylene, with the minimum amount of unsaturation, burns approximately twice as fast as methane, and that acetylene, with a maximum unsaturation, burns twice as fast as ethylene, or approximately four times as fast as methane. The number of B.t.u.'s which can be liberated per cu. ft. depends upon the rate at which the fuel can be burned. Bunker C oil is a relatively slow fuel compared to a medium fuel oil or to a light fuel oil.

Under No. 2, the rate of B.t.u. absorption by the change in the heating zone, the charge can absorb heat by radiation, convection and conduction. The B.t.u.'s can be absorbed either directly from the flame or from the kiln lining. It is well to know what the specific heat and thermal conductivity of the charge and of the refractory lining are at various stages of burning. The rate of change of the chord, that is, the surface of the charge exposed to radiation and convection both from the flame and from the kiln refractories, the relative time of submergence of an individual particle in the bed, the size of the pieces which compose the charge, and the thickness of the surface of the charge which is heated to a maximum temperature compared to the thickness of the bed are worthy of careful consideration. The rate at which the surface of the charge changes is a function of the kiln speed, provided that the rate of charge remains constant. To determine whether B.t.u.'s are transferred by conduction from the lining to the adjacent charge, it is important to measure the temperature of the charge and of the refractories both at the bottom contact line and the top contact line of the charge and the refractories. A consideration of these temperature measurements will determine whether B.t.u.'s leave the lining and go to the charge, or whether the B.t.u.'s leave the charge and go to the lining.

Assuming that the flame temperature is much higher than the temperature required to accomplish the physical or chemical change which is to take place in the kiln, it is important to determine whether the feed can be increased sufficiently so that the B.t.u.'s can be absorbed by the charge without overheating the charge. This is particularly important in the nodulizing of iron oxide and manganese oxide where fusion may take place to an undesirable extent and in the burning of lime and dolomite where the surfaces may be

FIG. 6—Iron ore nodules made from sludge. Specific gravity of the nodules is 4.79; porosity is 28 per cent, and weight per cu. ft. 140 to 143 lb.

	Per Cent
Total Fe	64.3
FeO	18.89
CaO	4.4
SiO_2	4.9
Al_2O_3	0.4
P	0.22
S	0.01

	Per Cent
+1 in.	8
Through 1 in. on ½ in.	46
Through ½ in. on ⅜ in.	20
Through ⅜ in. on 4M	14
Through 4M on 8M	8
Through 8M	4

heated to a point where the lime is no longer active. Too high temperatures may cause rings, melting or decreased chemical activity. In the burning of refractory grade magnesia in rotary kilns, the flame temperature cannot be too high since it is the object of this operation to cause the magnesia to nodulize and to become as inactive chemically as it is posto make it.

Hints for Kiln Operations

Most operators start their kilns by heating the lining up to feed temperature with little or no charge on the lining. The combustions of the fuel, therefore, prepare the lining for scale and rings. Instead of this procedure, it is preferable to be sure that the kiln lining is covered with charge and that when the full amount of fuel is started, that the feed be at least 10 per cent greater than the predetermined capacity. This is done to protect the lining. As soon as the combustion reaches the desired heat liberation, the feed is gradually cut back until the discharge from the kiln is the desired product. During this adjustment, the rotation of the kiln and the fuel consumption are always kept constant. After the finished product is right, small changes in the amount of fuel burned may be changed to control the size or conditions of the nodules. Since there are three major variables in rotary kiln operation: Rate of rotation, rate of solid feed and rate of fuel consumption, two variables should not be altered at the same time. The effect of change of each variable should be analyzed separately and carefully.

With this type of starting, it is necessary to have facilities to return unsatisfactory discharge to the charge end of the kiln. These facilities are also most valuable, since if a mud ring or clinker ring starts in the kiln, a charge of 5 to 15 tons of large nodules can be fed to the kiln in as short a time as possible. As the nodules roll through the kiln they will break out a mud ring and wear through a clinker ring.

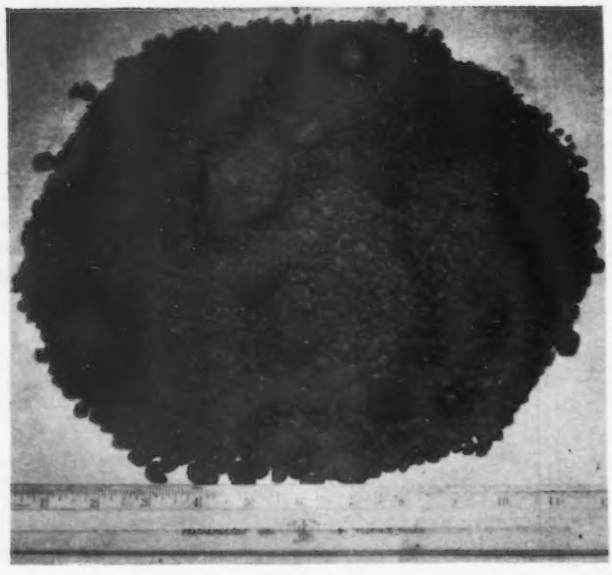


FIG. 7. Manganese ore nodules having a specific gravity of 4.56 and porosity 19.71.

	Per Cent
Mn	64.17
Fe	0.38
SiO_2	3.04
P	0.017

	Per Cent
+½ in.	14.18
Through ½ in. on ¼ in.	19.44
Through ¼ in. on 4M	19.39
Through 4M on 8M	31.02
Through 8M on 10M	4.68
Through 10M	11.29

Determining Thickness of Electrodeposited Tin Coatings

AN improved method of determining the local thickness of electrodeposited tin coatings is claimed by the Russians, R. G. Genes, A. D. Goldman and J. B. Lŭkov, in *Zavodskaya Laboratoriya*, 1941, Vol. 10, p. 477. This procedure makes use of a corrosive solution dropping at a definite rate onto the sample tilted at 45 deg. The observer measures with a stopwatch the time required to expose the underlying metal. Acid solutions of antimony chloride have been suggested for the corrosive solution but after many experiments with various liquids, including HC1, HNO_3, H_3PO_4, and $Fe_2(SO_4)_3$, of different strengths, the following solution was selected for a final trial:

HNO_3 (*d* (1.40).....130 c.c.
HC1 (*d* 1.18)..... 50 c.c.
$Fe_2(SO_4)_3$ ..... 26 grams
H_2O ..... to 1 liter

When this solution was allowed to drop on electro-tinplate at a rate of 120 ± 10 drops a min. the time required for dissolution was about 1 min., which is not too long for routine measurements and not too short to be exactly measurable.

To find the relation between the thickness of the coating and the time of dissolution, coatings having a uniform thickness had to be prepared. The uniformity was achieved by making the cathode the bottom of a shallow tapering hole in a rubber plate, the large anode being fixed parallel to the plate. Alkaline baths were used throughout.

It was shown, first of all, that the rate of dissolution of the coating by the corrosive liquid was independent of the base metal and of the thickness of the coating, within the range investigated, that is, 0.0003 in. to 0.001 in. (Since in modern electrotinning much thinner coatings are used, a modification of the method would seem necessary for the modern tinplate.) Then the composition of the bath was changed, and it was shown that the rate of dissolution remained constant for the following electrotinning baths: (1) Sn 21, NaOH 18, Na_2Co_3 9 to 16 grams per liter; (2) Sn 20, NaOH 16, Na_2CO_3 16 grams per liter; (3) Sn 20, NaOH 25, Na_2CO_3 18 grams per liter; or (4) Sn 21, NaOH 18, Na_2CO_3 72 grams per liter was used. Using bath (1) the current density was varied between 0.5 and 2 amp. per sq. cm. (about 5 to 19 amp. per sq. ft.); and using bath (2) the temperature of the electrodeposition was varied between 60 deg. C. and 80 deg. C. (140 deg. F. and 176 deg. F.); all without affecting the rate of subsequent dissolution.

On the other hand, the rate of dissolution depends on the temperature of the corroding liquid. In the table the inverse rate of dissolution is given in sec. per 0.0001 in., and it is seen that the higher the temperature, the less time is required for dissolution.

Temperature, deg. F.	*Inverse Rate of Dissolution Sec. per 0.0001 in.*
59	12.5
72	9.8
88	8.5
100	6.8

Titanium Bearing Graphitized Pig Iron

IT is a well-known fact that occluded oxides are a source of foundry difficulties in the production of sound castings, especially when rusty scrap is used in the cupola mixture. These impurities decrease fluidity and cause shrinkage pockets, chill and hard spots in castings, impairing their machinability. In order to reduce these troublesome oxides to a minimum—either in the pig iron as it comes from the blast furnace or in the iron from the cupola—the general practice is to run the metal as hot as possible and sometimes to use a deoxidizer in the cupola iron.

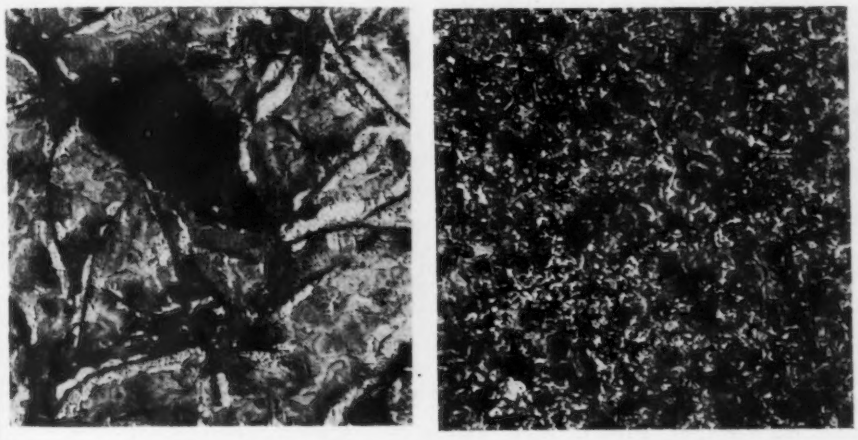


FIG. 1—Microstructure at 100 diameters of castings made from (left) 35 per cent regular pig iron in cupola charge and (right) 35 per cent G-Iron. Specimen etched. (Reduced one half)

The problem of eliminating hard spots from gray iron castings prompted Tonawanda Iron Corp. to undertake a long series of experiments directed toward the production of a pig iron which would eliminate the effect of these impurities on the foundry casting. It has long been known that titanium is a good reducing agent and that it has a decided effect upon the structure of the iron by decreasing the size of the graphite flakes. As a deoxidizer it may be used to improve the fluidity of oxidized iron. However, until these experiments were made, titanium has been introduced by ferro-titanium additions to the ladle. Tonawanda has perfected a blast furnace technique that permits charging titanium bearing material in the furnace burden. A pig iron is produced in which the graphite is finely divided and evenly dispersed throughout the matrix. What is even more important, Tonawanda claims that this graphitized condition of the pig iron persists through the melting operation in the cupola and imparts to the castings the improved properties normally associated with titanium bearing cast iron. This pig is called G-Iron.

Briefly, the method for making the pig consists of charging the blast furnace with a mixture of Lake Superior hematite and some titanium bearing material such as ilmenite or rutile. In order to reduce the titanium oxide and to completely dissolve Ti in the molten iron, the temperature in the combustion zone is maintained as high as possible and a larger than normal volume of basic slag is used. Air blast temperature is of the order of 1500 to 1600 deg. F. and the slag volume is maintained between 1300 and 1500 lb. per ton. Superheating the iron in this way not only aids in putting about 0.40 to 0.50 per cent Ti in the iron but also in causing the free carbon to be separated out in finely divided form. The graphitizing action of titanium is like that of silicon but is stronger. The process is covered by U. S. patent No. 2,298,483.

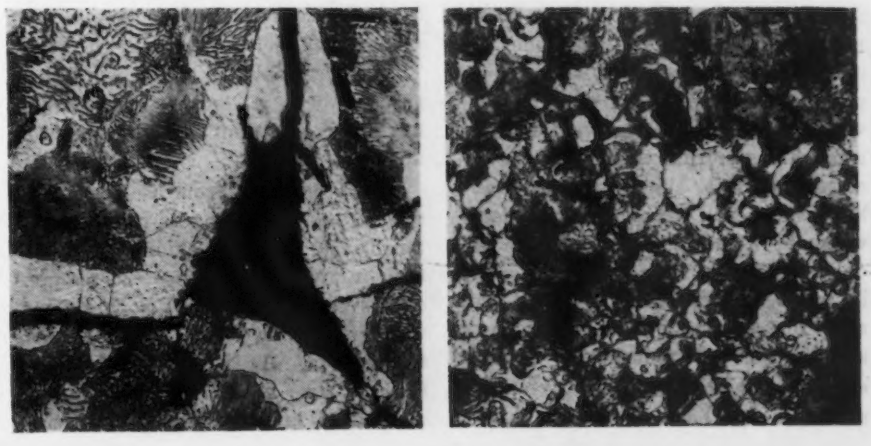
Four claims for superiority of G-Iron are made:

(1) Refined and uniform grain structure
(2) Greater fluidity
(3) Reduction in internal shrinkage and chill
(4) Better machinability

The photomicrographs compare the microstructure of castings made from G-Iron and regular pig iron. In both cases 35 per cent pig iron was used in the cupola charge and the analysis of the castings was approximately 2.10 per cent silicon and 3.60 per cent total carbon. In the graphitized iron casting, the combined carbon is 0.38 per cent or six points lower than that made with regular pig iron. At both 100 and 500 magnifications, the cast-

(CONTINUED ON PAGE 128)

FIG. 2—Microstructure at 500 diameters of castings made from 35 per cent regular pig iron (left) and 35 per cent G-Iron (right). (Reduced one half.)



Flash-Butt Welding

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. . . The techniques for controlling metallurgical changes around the heat-affected zone at the weld line and in the parent metal are presented by the authors in this concluding discussion of a three-part article. Defects found in flash-butt welding are illustrated, the causes are indicated and remedies proposed.

SINCE the heat in a flash weld is localized between the dies, and since the greatest heat is generated at the faces to be welded by virtue of the flashing action, there are successive metallurgical changes in the finished flash weld, from the highly treated structure at the center of the weld through the heat-affected zone to the undisturbed parent metal. The heat-affected zone of flash-butt welds in steel is that area on each side of the weld line which has been heated during welding to temperatures above the lower critical. The edges of the heat-affected zone as indicated by Fig. 12 *A* and other photomacrographs were determined by visual inspection after etching. That portion of the welded material not between the electrodes, as well as the material in contact with the electrodes, remains relatively cold and hence is capable of carrying heat away from the weld. Consequently the weld cools at a much faster rate than would be encountered in a simple air cool, and hardening will result, particularly when the welded section is small. Not only will there be a marked change in microstructure across a weld, but also the hardness will vary, to a small extent in steels of low hardenability, and to a greater extent in steels of high hardenability.

Fig. 12 shows an etched section of a flash weld in low carbon cold rolled steel. The weld, upset and heat affected zones are clearly shown. The photomicrographs, Fig. 12 *B*, *C* and *D*, at 200 diameters, show the structures existing near the edge of the heat-affected zone, at the weld line, and in the parent metal respectively. Fig. 12 C, at the weld line, illustrates the coarse structure indicative of high heat and the presence of ferrite and pseudo-martensite. Pseudo-martensite is used to describe the hardened structure of a low carbon steel, since not enough carbon is present to produce full martensite and hence full hardening. The weld zone has reached a temperature far above the upper critical point of the steel; as a matter of fact, its temperature has nearly reached the melting point of the steel. Theoretically all the metal which has actually been melted at the weld line has been extruded by means of the upsetting action.

As we progress from the weld zone toward the parent metal, pseudo-martensite is still in evidence but is finer in appearance, since the temperatures reached were not so high, but were still above the upper critical temperature. As the edge of the heat-affected zone is approached, the zone is reached in which the temperature had been raised to between the lower and upper critical points. This is the area which has been incompletely transformed on heating. The original pearlite (dark) and part of the ferrite (white) has transformed into austenite on heating and has reformed into martensite on cooling. The remainder of the ferrite has not been transformed on heating, since the upper critical was not reached, and it remains as it did before heating, except that the effects of cold rolling have been removed by the heating. Fig. 12 *D* illustrates the original, unaffected parent ferrite grains and pearlite areas. Note the directional effect produced by cold working.

Variation in hardness across a weld in low carbon cold rolled steel, and the correlation of the hardness values with the microstructure are illustrated in Fig. 13. The original hardness of the low carbon cold rolled steel (189 Vickers) is higher than that of the weld, by virtue of the hardness imparted by the cold working. There is little hardening of the weld since the carbon content is too low for much quench hardness to develop. There is, however, a zone on either side of the weld (in the heat-affected zone) which is slightly softer than the weld, as shown by the hardness plot. It is in this zone that we should expect the fracture to occur during a tensile test.

In a flash weld in hot rolled steel the parent metal is softer than the weld zone or heat-affected zone, because the hardness imparted by the cold rolling is not present. Hence a tensile test of a flash weld in hot rolled steel usually breaks in the parent metal. The metallurgical changes in a flash weld in a 0.25—0.28 per cent carbon, 0.60 —0.80 per cent chromium, 0.80 —1.00 per cent

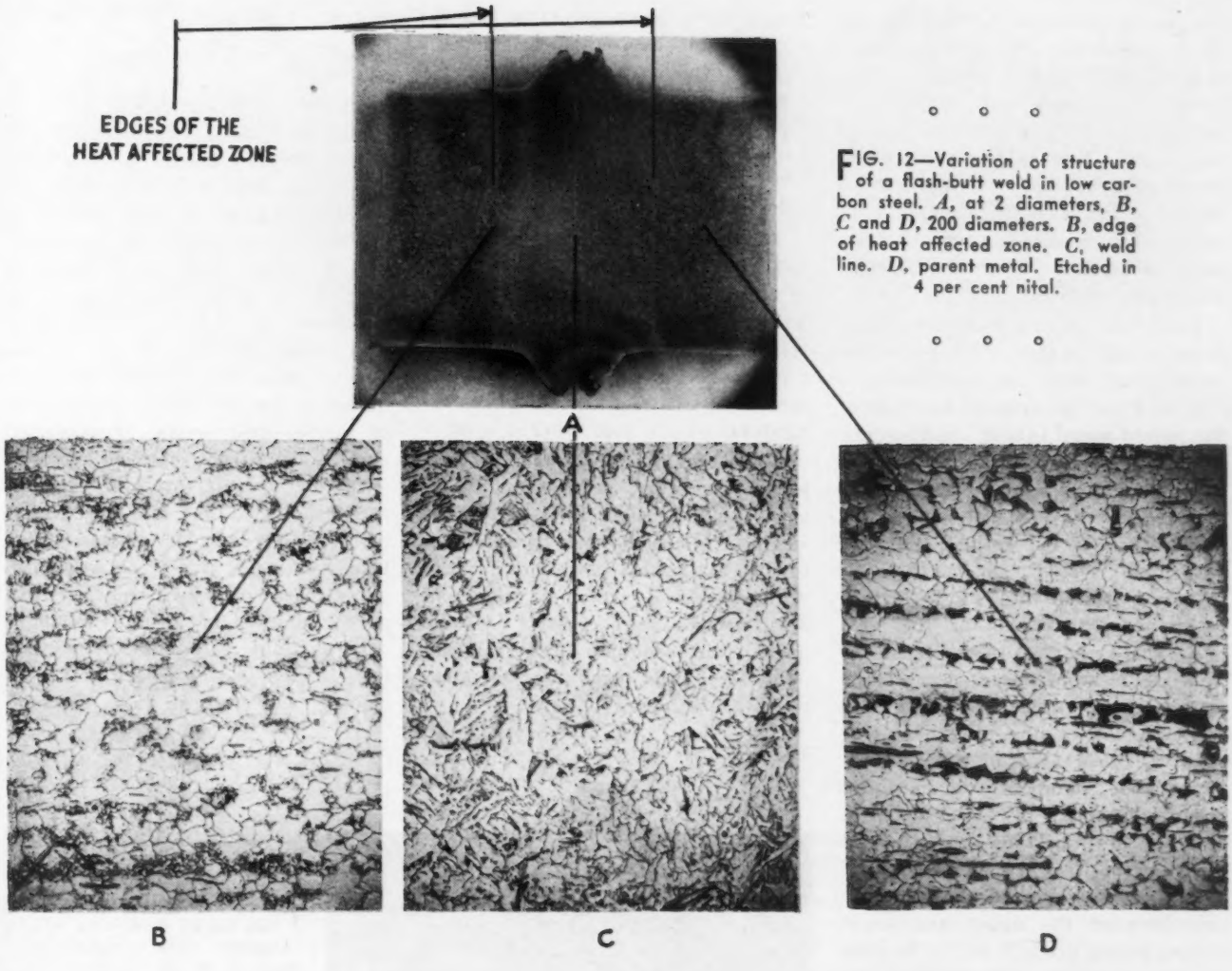
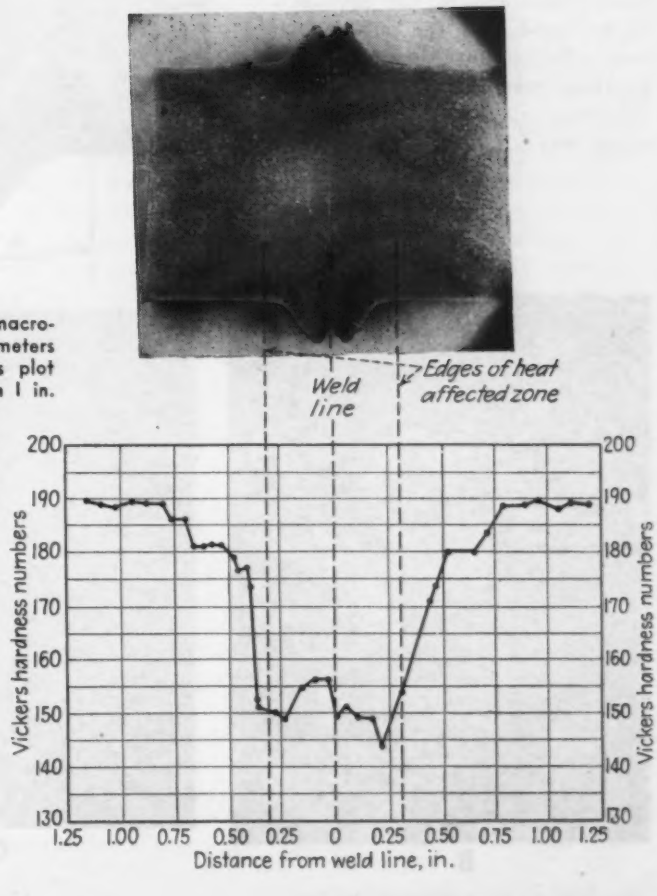


FIG. 12—Variation of structure of a flash-butt weld in low carbon steel. *A*, at 2 diameters, *B*, *C* and *D*, 200 diameters. *B*, edge of heat affected zone. *C*, weld line. *D*, parent metal. Etched in 4 per cent nital.

nickel, 0.50 —0.60 per cent molybdenum steel are shown in Fig. 14. This steel had been hardened and tempered to 260 Vickers before welding. The photomacrograph, Fig. 14 *A*, shows the main characteristics of the weld. Note the thin white area down the middle of the weld. This is the so-called "decarburized zone," which probably also contains some remnants of cast metal which have not been ejected by the upsetting action. Photomacrograph Fig. 14 *C*, at 200 diameters, illustrates the structure at the middle of the weld. Here we have full martensite, since the carbon content is high enough to produce it. Moreover, the structure is coarse because of the high heat to which the weld attained. Again progressing outward from the weld line, martensite is found, becoming more finely divided as the distance from the weld increases, due to the fact that the temperature peaks reached were lower than at the weld line. Near the edge of the heat-affected zone is located the area Fig. 14 *B* which was heated in the temperature zone between the two critical points. Here the tempered

RIGHT

FIG. 13 — Photomacrograph at 2 diameters and Vickers hardness plot across a flash weld in 1 in. diameter low carbon steel. Specimen etched in 4 per cent nital. Hardness values plotted across the center of section.



martensite present in the original parent metal has only partially transformed, resulting in a mixture which, after cooling once more, resolves itself into ferrite and very fine grained martensite. Fig. 14 *D*, at 200 diameters, shows the parent metal, which had originally been hardened and tempered. The structure shown is tempered martensite, which is typical of this heat treatment.

Variations in the hardness values across a weld in this chromium-nickel-molybdenum steel are illustrated in Fig. 15. From the original hardness of the parent metal (about 260 Vickers), the hardness begins to rise sharply at the edge of the heat affected zone until a value of over 500 Vickers (48 Rockwell "C") is reached near the weld line. The dip in hardness at the weld line is thought to be due to the decarburization of the weld line. The areas to either side of the weld line have been heated to a high enough temperature to cause full hardening on cooling. Further away from the weld (still in the heat affected zone) temperatures have not been high enough to cause full hardness or cooling. The areas toward the edge of the heat affected zone which have been heated to a temperature between the upper and lower critical points are still softer because of incomplete transformation. The lowest hardness in the specimen is to be found near the outside of the heat affected zone, where the temperature rose to a point just below the lower critical point. This temperature was slightly higher than the tempering temperature (1200 deg. F) of the original parent metal; hence a slight softening occurred. Had the original temperature been lower, the dip in hardness would have been more noticeable.

Heat Treatment After Welding

The hardness survey across a flash weld in low carbon cold rolled steel shows little change in hardness from point to point. Therefore no heat treatment to make the hardness uniform is necessary, particularly since such heat treatment would lower the hardness of the cold worked steel.

When a hardenable steel is flash welded, however, considerable hardness of differentials exist across the weld, as is clearly seen by reference to Fig. 15. In this case, if uniformity of hardness is desired, heat treatment after welding is necessary. A weld made in the chromium nickel molybdenum steel was heat treated after welding as follows:

1 hr. at 1650 deg. F.—Air cooled

1 hr. at 1550 deg. F.—Water quenched

Tempered 1½ hr. at 1200 deg. F.

Fig. 16 shows the macrostructure and hardness value across the weld due to this heat treatment. Note that the hardness across the weld is as uniform as it would have been in the parent metal. This serves to prove that it is possible, by proper heat treatment, to restore a flash welded part to the uniformity of an unwelded bar. As mentioned before, this is reflected in the fact that in tensile tests of heat-treated welds, breakage occurs in the parent metal or the weld with no loss in strength (tensile strength) but some loss in ductility in the latter case. If, instead of full heat treatment, this piece were tempered to the original hardness of the parent metal, the results would be only partially successful. The hardness of the parent metal would not change, and that of fully hardened

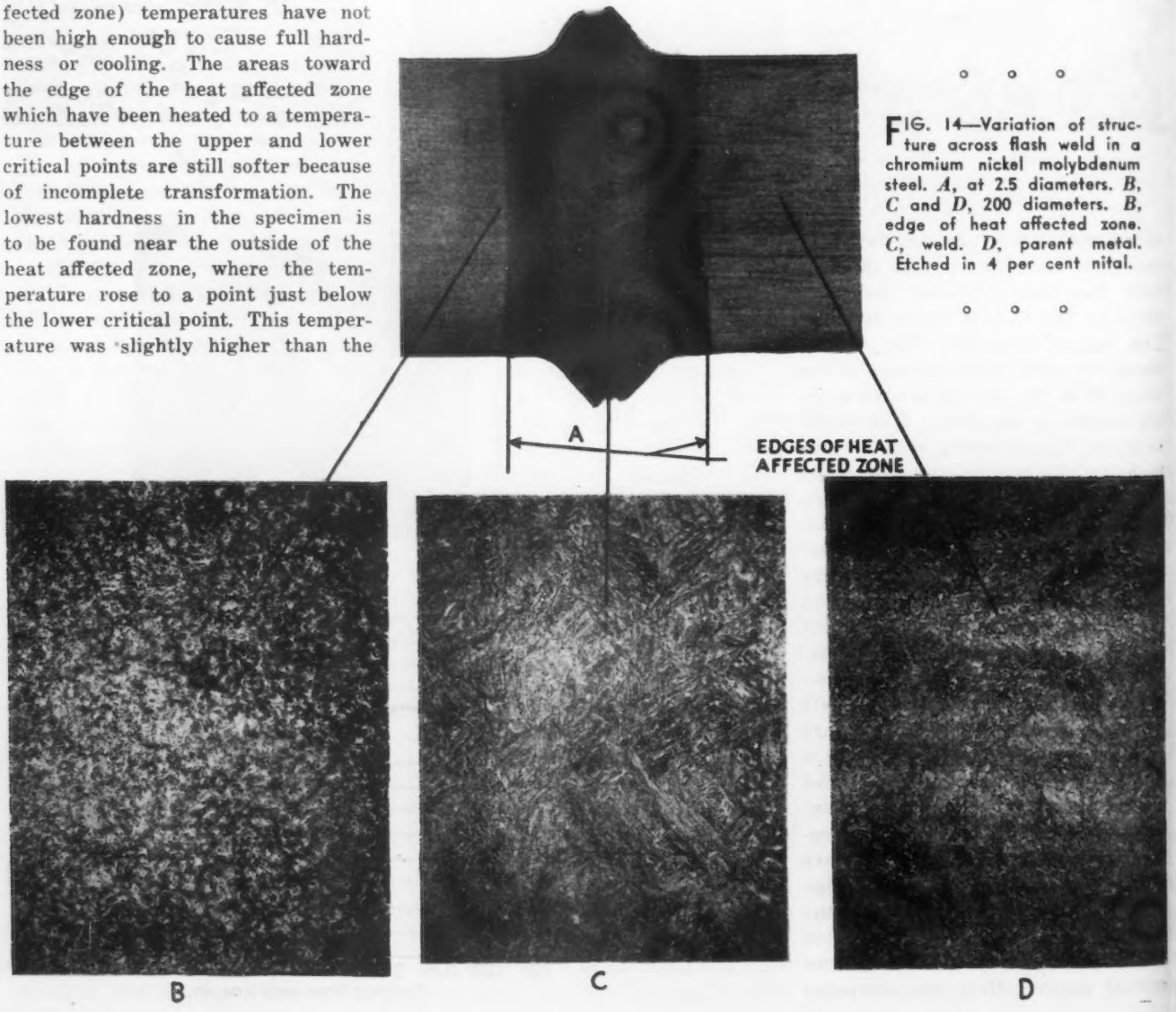


FIG. 14—Variation of structure across flash weld in a chromium nickel molybdenum steel. *A*, at 2.5 diameters. *B*, *C* and *D*, 200 diameters. *B*, edge of heat affected zone. *C*, weld. *D*, parent metal. Etched in 4 per cent nital.

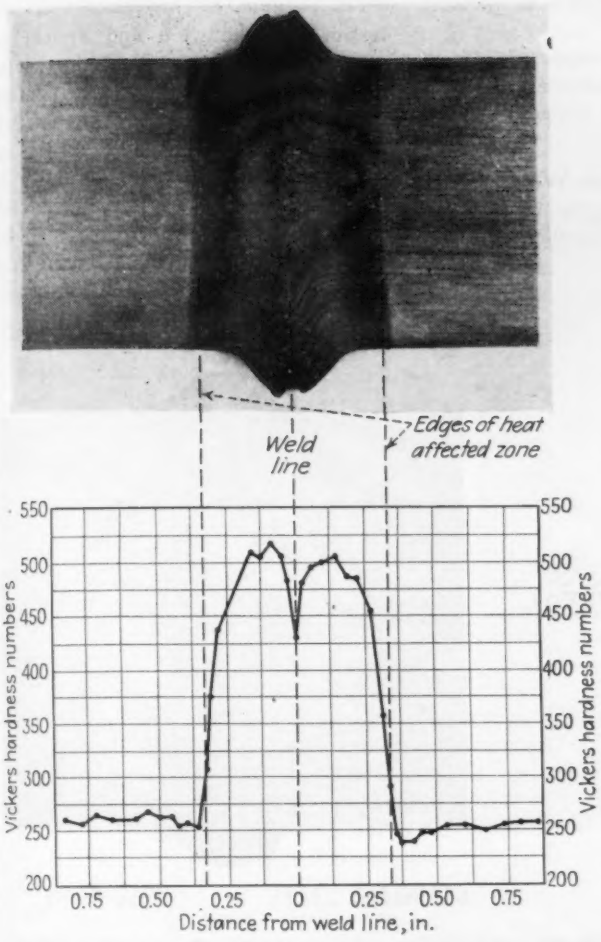


FIG. 15—Vickers hardness plot across a flash weld in 1 in. diameter chromium nickel molybdenum steel as welded.

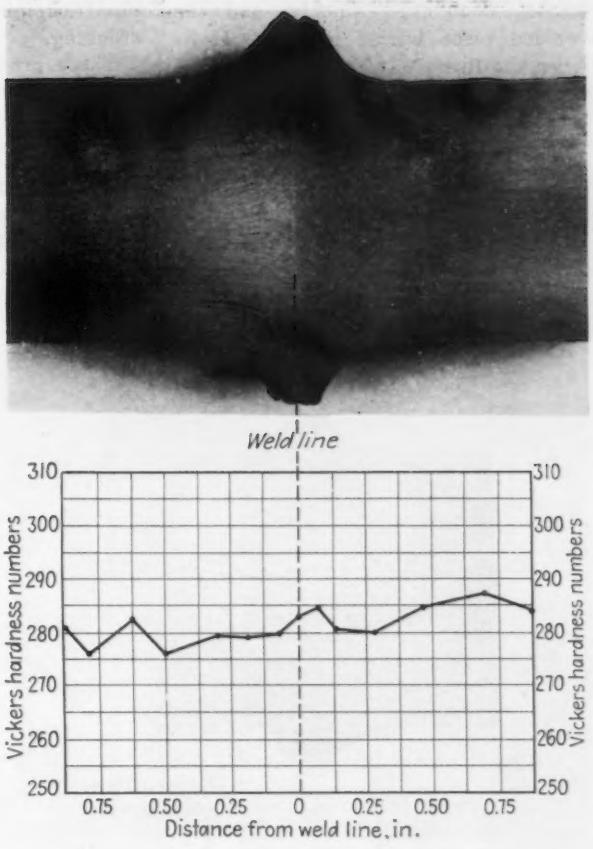


FIG. 16—Photomacrograph at 2.5 diameters and Vickers hardness plot across a flash weld in 1 in. diameter chromium nickel molybdenum steel. Specimen normalized, water quenched, and tempered at 1200 deg. F. after welding. Specimen etched with 4 per cent nital. Hardness values plotted across the center of section.

portions of the weld would temper to the same hardness as the parent metal. Near the edge of the heat-affected zone, however, where full hardening after welding did not occur, tempering would soften the material to below the hardness of the parent metal. For some applications this lowering of hardness would not be great enough to cause trouble in service.

Tempering in the flash welding machine has been considered, that is, passing a current of the proper magnitude through the welded piece to raise the weld to the proper tempering temperature. It would be difficult, however, to maintain a uniform temperature between the dies. If the edge of the heat-affected zone were properly tempered by this method, the areas nearest the weld might be overtempered and softened. At low heat-treated hardness, however, as in the case of furnace tempering, tempering in the welder might be feasible and warrants investigation. When high heat-treated hardnesses (300 Brinell and above) are desired, it is difficult to see how they could be attained except by a full quench and temper after welding. Merely tempering, either in a furnace or in the welder, will cause a dip in the hardness near the edge of the heat-affected zone. If we elect to harden by post heating in the welder and then temper, we should still have uneven hardness, since in the hardening heat there will be a temperature gradient and hence a hardness gradient, which will not be overcome in tempering, for the reasons noted above.

Brittleness and Cracking

The chromium nickel molybdenum steel mentioned above is not high enough in carbon content to harden to such an extent as to crack on cooling from welding. This danger exists, however, in steels of higher carbon content. In Fig. 17 is shown a flash weld between SAE 4150 steel (0.50 per cent carbon, chromium-molybdenum) and SAE 1040 (0.40 per cent carbon steel). In the SAE 4150 steel two cracks can be observed at the outer edge of the upset section. These cracks are really the ends of one crack which travels around the periphery of the bar. The cause of this cracking was the extreme hardening of this area on cooling after welding. Also the work geometry at this point provides a good stress concentration point for the start of cracking. Observe from the plot the high hardness in the SAE 4150 weld zone, 530 Vickers.

When a condition like this is encountered, it is obvious that some means must be taken to slow down the cooling rate from the weld. This can be done by unclamping the electrodes immediately upon completion of upset and transferring the welded piece to a furnace which is held at a temperature between 1200-1500 deg. F. After the pieces have been uniformly heated to this temperature, they are buried in lime to insure slow cooling. If no furnace is available, the weld can be reheated in the welding machine by passing a current through the finished weld until a dull red color is perceived. Then the current is turned off, the elec-

trodes unclamped quickly, and the welded piece buried in lime. However, the furnace treatment is the recommended procedure.

An application in which cracking difficulties of this sort are encountered is the flash welding of high speed steel drills to medium carbon or alloy steel shanks. Cracking is prevalent in the high steel drill unless one of the aforementioned steps is taken to insure slow cooling from put back into the furnace to prevent cracking.

There are several types of defects to be found in flash welds, all of which can be overcome by proper welding technique.

Defects in Flash Welds

1—Parting line below surface of work: If there is insufficient upset, caused either by too little heat or insufficient upset pressure, the parting line between the two upset portions of the weld may extend to below the surface of the piece, that is, there may not be a 100 per cent weld across the entire surface. The weld then will not clean up in machining. Obviously a transverse crack or non-fused area of this sort is detrimental. A greater upset pressure, or more heat, or both, is necessary.

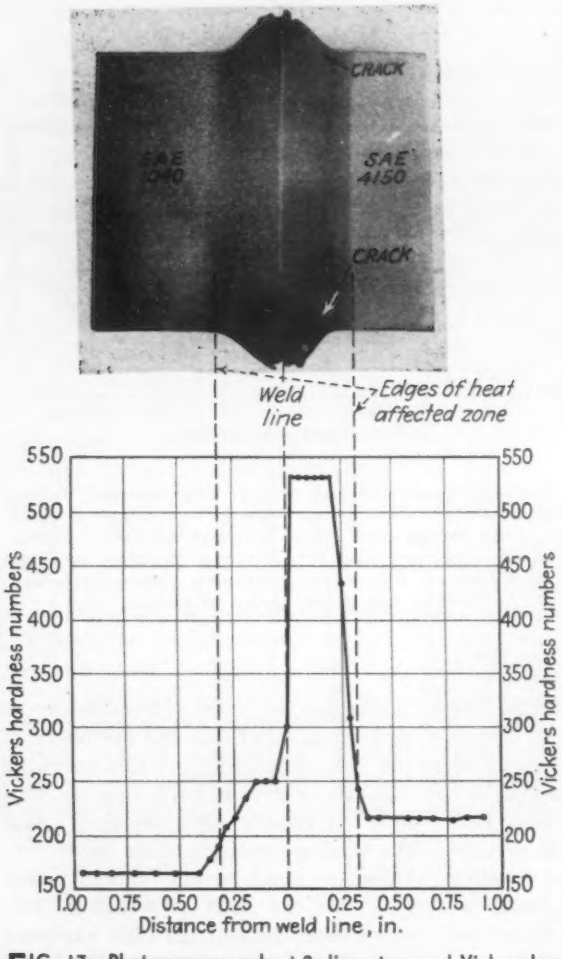


FIG. 17—Photomacrograph at 2 diameters and Vickers hardness plot across a flash weld of 1¼ in. diameter SAE 1040 steel to 1¼ in. SAE 4150 steel. Specimen etched in 4 per cent nital. Hardness values plotted across center of section.

FIG. 18 (Above)—Photomacrograph of a flash weld between a heat resisting stainless steel and SAE 4140 steel (chromium molybdenum). (Below) Structure of the cast stainless steel in the same weld at 250X.

2—Cast metal in the weld: A certain amount of molten metal forms at the weld faces during flashing. This molten metal is partially extruded from the weld during upset, leaving the weld area in a homogeneous condition. Sometimes, however, pockets of molten metal are trapped in the weld and appear as cast metal under the microscope. Since cast metal is prone to contain small shrinkage cracks, and since it does not possess the ductility of worked material, it is desirable to keep the amount of entrapped cast metal to a minimum. Fig. 18 shows a photomicrograph of a flash weld between a heat-resisting stainless steel and SAE 4140 steel (chromium-molybdenum). The white areas in the middle of the weld are cast stainless steel. The SAE 4140, having a lower hot compressive strength than the stainless steel, upset to a greater degree and so entrapped the cast stainless in the weld. Moreover, the stainless became hotter during welding because of its higher electrical resistivity; this further promoted the formation of cast metal. Fig. 18 at 250 diameters shows the appearance of this cast metal at higher magnification.

3—Voids: A 5 in. diameter cold rolled steel bar was flash welded in the weld. When new drills are made by this method, furnace heat treatment is usually carried out after welding. When drills are repaired or made longer by flashing welding a short drill to a shank extension, rehardening after welding is not feasible, so that slow cooling after welding is necessary not only to prevent cracking, but also to minimize brittleness in the weld area, which would lead to premature failure in service. In some extreme cases, the parts to be welded are furnace preheated, welded, and immediately

a machine too small for the purpose. Consequently the upset pressure was insufficient to close up all the craters formed during flashing. Fig. 19, at 10 diameters, illustrates the void left by the crater. Moreover, some molten metal had formed at the weld and had been extruded into part of the void by the upsetting action. The cast metal is seen in the form of a globule in the void. Fig. 19, at 200 diameters, is a photomicrograph of the cast metal in the globule.

4—Oxides and inclusions: Oxides and slag inclusions are present in a weld if there is insufficient upset pressure. Inclusions of this type are seen in Fig. 20, a photomicrograph at 650 diameters. The weld in question was one made in a 6 in. o.d., ¼ in. wall SAE X-4130 steel tubing. When the workpieces were clamped in the welder, the two halves of the electrodes did not meet around the tubing but lacked meeting by about 1 in. At the location of this gap, since there was no copper present to conduct away the heat, the weld became hotter than did those portions of the weld whose adjacent areas made contact with the electrodes. The colder parts of the weld upset properly, but the parts located at the gaps were not permitted to upset as much as their plasticity would allow. Consequently entrapped inclusions were present. Small as these inclusions are, they exhibit a weakening effect on the weld, as was consequently proved by tension tests. The tubes were heat treated after welding and test bars cut, both from the portions of the weld located under the dies, and from the portions at the gap between the dies. The former all broke outside the weld at high strength and high ductility; the latter all broke in the weld at low strength and low ductility. Those that broke in the weld exhibited slaggy, non-metallic fractures.

5—Oxidation and burning: It is seldom that welds are made with such poor technique that they are burned. Burning in steel is intergranular oxidation caused by high heat. In Fig. 21, at 8 diameters, is shown a flash weld between high speed and SAE 4140 steel. Due probably to improper extensions of the materials from the electrodes, too much heat went into the high speed steel, as is evident from the fact that the high speed steel upset so much that it formed a collar over the SAE 4140, while the 4140 did not upset at all. So much heat was developed that the high speed steel oxidized at a point back of the weld. The burning, or oxidation, progressed to such a degree, feeding on the grain boundaries of the material, that the part fell into two pieces. The heat input into the weld was so unbalanced that the high speed steel received an excessive amount. The remedy was to give more heat to the 4140 and less to the high speed steel by extending the 4140 farther and high speed steel less from their respective electrodes. When this was done, no further failures of this type occurred. Notice also in Fig. 21 the presence of a locally melted area,

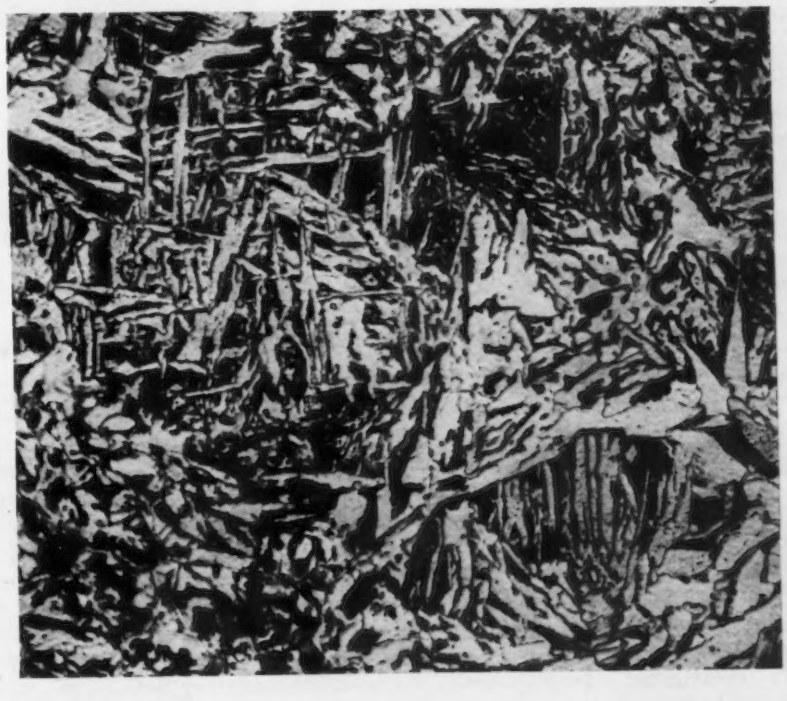


FIG. 19 (Above)—Illustrating at 10 diameters the void left by the crater due to insufficient upset in a flash weld in 5 in. diameter cold rolled steel. (Below) Microstructure (200X) of cast metal extruded while molten into void shown at top. Etchant 4 per cent nital.

or "burn," in the high speed steel. This was a spot of high current concentration due to improper electrode contact.

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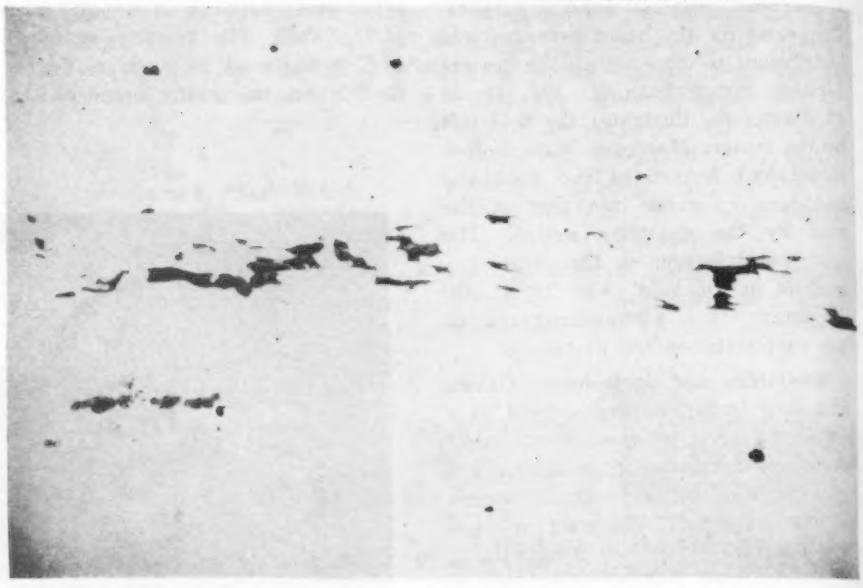


FIG. 20—Photomicrograph at 650 diameters, showing presence of oxides and slag inclusions in butt flash weld. No etchant. Under tensile tests, specimens containing defects like this break in the weld with a non-metallic fracture.

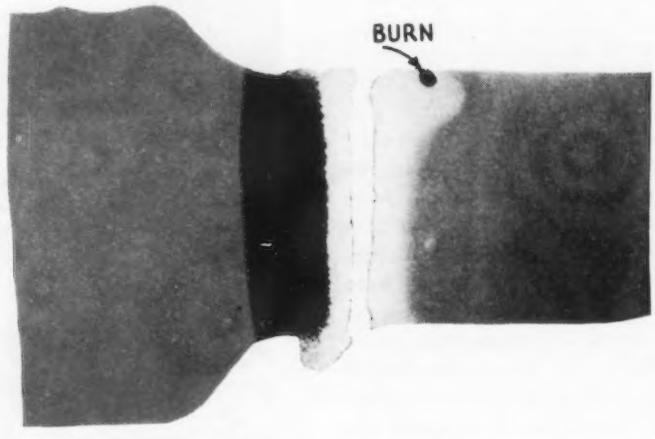


FIG. 21—Flash weld between SAE 4140 steel (left) and high speed steel (right). High speed steel was overheated, as evidenced by the large steel upset. Breakage of high speed steel was due to oxidation. Magnification at 8 diameters. Specimen etched in 4 per cent nital.

Oxygen Enriched Blast Investigated

THE combustion of coke with oxygen enriched blast and its influence on the blast furnace process are discussed in an article in "Archiv für das Eisenhüttenwesen," by R. Durrer, Petro Lwowycz and Borut Marincek, who state that the effect of oxygen enrichment in the blast for blast furnace operation with small additions of oxygen, has been previously investigated. In this work, it was established that an enrichment of the order of a few per cent brings an appreciable increase in production and a reduction of the coke consumption. If, however, the enrichment is pursued to such a degree that no further lowering of the throat gas temperature is possible, no further economy in coke consumption is possible, when working along orthodox lines. In addition, with increasing oxygen content, the shaft temperature sinks continually lower in proportion, so that the efficiency of the blast furnace reaction falls away. In spite of the relatively high carbonmonoxide content of the gas, the concerting temperature necessary is lacking to allow of reduction to proceed to the normal extent. To a corresponding degree, the amount of direct reduction performed in the blast furnace process increases accordingly, and as a result the coke consumption rises in ratio.

The problem resolves itself practically into arresting the combustion of the coke at its primary stage of the formation of carbon dioxide, and to prevent the secondary reaction of the carbon monoxide reduction phase from occurring. In normal blast furnace operation, the formation of carbon dioxide is exclusively an intermediate stage; outside the constricted oxidation zone, only carbon monoxide is in evidence as the combustion product of the coke, and the former, in its upward course through the furnace, as a result of indirect reduction, is partly converted into carbon dioxide, which lowers the carbon monoxide content. As a result, the throat gas

(CONTINUED ON PAGE 128)

Longer Life from Tipped H.S.S. Tools

By LEO J. ST. CLAIR
President, General Tool & Die Co., East Orange, N. J.

. . . Use of a soft, resilient bond and braze allows the use of hardnesses in the tip that would ordinarily be too high for safety in a solid tool and enables tipped high speed steel tools to out-perform solid tools of the same analysis. Wider use of high cobalt types in tip form is indicated.

WHEN we first started tipping tools with high speed steel by a new process early in 1940, the purpose was to stretch the limited supply of high speed steel then in existence, particularly the cobalt grades which by 1942 were difficult to secure. Tipping was being applied primarily from a salvage and conservation standpoint, but as time went on it became evident that tipping, at least by our method, resulted in a very definite increase in performance of a tool as compared to the performance of the same material in solid form. Reports from users indicated that these tipped H.S.S. tools were often showing increases in life between grinds of from 100 to 500 per cent over the solid tools used on the same work. What often puzzled users was the fact that the tipped tools had been made up from the scrap ends of solid tools that had been ground back until they were too short for further use. Why there should be such an increase in performance merely by changing from a solid form to a tipped form of the same high speed steel was an enigma to all concerned.

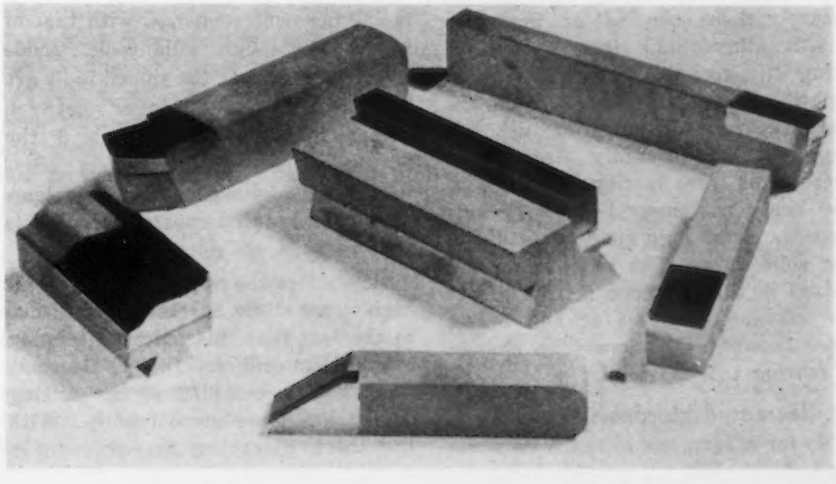
To explain this phenomenon it is necessary to analyze tool failures. In 1902, Frederick W. Taylor came to the conclusion that tool dulling occurred in two phases—the initial dulling resulting from pure abrasion taking place at a slow rate, and final dulling or breakdown due to heat softening from excessive abrasion due to loss of clearance and the friction of the chip on the top face of the tool. This softening of the cutting edge area results in rapid destruction and often "burning" of the tool. This theory was accepted without question until the advent of carbide tools. Users soon learned that the successful use of carbide tools on steel cutting required high cutting speeds and that low peripheral speeds were detrimental to tool life. Here is an instance where the increased abrasion forces due to high cutting speeds do not wear the tool as fast as the presumably lower abrasion forces at play when using low cutting speeds.

Theory of Dulling

Since an examination of dull tools gave no clue as to the cause of this condition, to find the real answer a study was made of the gradual dulling of two carbide tools, one cutting steel at 300 ft. per min., the other at 100 ft. per min. Corresponding tool lives were 400 and 50 pieces between grinds. Each tool was examined carefully with a magnifying glass at the end of each cut. The first thing observed was minute chipping of the cutting edge in both tools. This chipping became noticeable after the first five pieces at the low cutting speed, while the same chipped condition did not appear at the higher cutting speed until after 100 pieces had been machined. The evidence of this minute chipping was destroyed after cutting about 20 pieces at the low speed and after doing about 300 pieces of high speed. Wear on the tools at this point looked like pure abrasion and the cutting edges of both tools appeared the same.

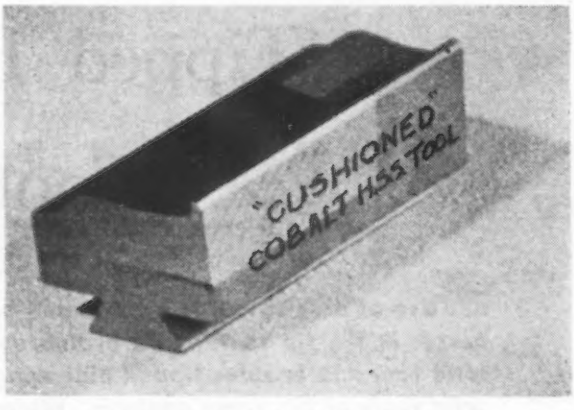
It is my belief that the cause of

GROUP of lathe tools and dovetail form tools made by brazing cobalt high speed steel tips to low alloy steel shanks.



the accelerated chipping of the cutting edge at the low speed is that the applied force of the chips takes place nearer to the cutting edge at the low speed than at the high speed. As the speed is increased, the force of the chip against the face of the tool is applied farther and farther away from the edge because of the greater "wedging" action taking place at the higher speed. This experiment proved that dulling takes place in three stages rather than two, the first and most important stage being the initial minute chipping. The second stage is gradual dulling due to abrasion and the final stage is abrasion and heat softening.

A similar analysis can be applied to the dulling of high speed steel. This theory accounts for the poor life of a tool that is made too hard for the job. In this case, chipping takes place rapidly compared with a tool of the proper and lower hardness.



USE of a high cobalt H.S.S. cutting tip brazed in a special manner to an alloy steel shank permits of higher hardness without danger of fracture in the dovetail of this forming tool. Life is longer than a solid tool of the same material.

On the other hand, if it is realized that initial minute chipping of the cutting edge is the most important reason why tools dull, it is obvious that any method used to delay this chipping action will increase the life of the cutting tool. The ability of our high speed tools to absorb the shocks encountered in machining metals apparently delays this minute chipping of the cutting edge and results in a definite increase in life. This is primarily due to the fact that a soft braze is used. No noticeable increase in life is obtained over solid tools if a hard braze or a weld is used to hold the tip to the shank.

Definite proof of the benefits secured by a soft braze acting as a cushion or shock absorber has been obtained on salvaged dovetail form tools. When the original high speed steel tools are ground down to the point where they are too short to hold securely, these stub ends are brazed to a soft alloy shank long enough to bring the tool back to its original length. Where tool life records are kept, reports from users of such salvaged tools repeatedly stated that these tools were lasting from 100 to 250 per cent longer between grinds than the same high speed steel did in the solid form. The only factor involved in this increase in tool life is the cushioning effect of the braze, since there was obviously no change in cutting tool material.

Increased Hardness Possible

So far a comparison has been made of tipped tools of the same hardness as the solid tool. It is possible to make further gains in tool life by making the tips harder than normally would be considered safe from the point of view of shank breakage and early appearance of minute chipping of the cutting edge on solid tools. With tipped tools, no concern need be given to clamping stresses on the tough alloy shank and hence the hardness of the tip can be considered purely from the viewpoint of its efficiency as a cutting tool. With the technique used at our plant, it is the practice to harden H.S.S. tips to 65-66 Rockwell C before brazing, with the assurance that such hardness will be retained in the finished tool. Tips only 1/16 in. thick have been brazed to shanks 1½ in. deep without affecting the hardness of the tip.

Compared with solid tools hardened to 62-63 Rockwell C, reports have come in from users indicating increases in tool life of 200 to 500 per cent. In one plant, accurate records have been kept on the performance of dovetail form tools used in machining 75-mm. shell. The average increase in life of over 1500 8 per cent cobalt H.S.S. tipped dovetail tools reported, is 250 per cent compared with that of 8 per cent cobalt solid tools. Aside from the fact that the tipped tools are lasting 3½ times longer between grinds, breakage of the tools in the dovetail has been completely eliminated and tool maintenance problems have been reduced substantially. This represents a considerable saving.

Heretofore the application of cobalt high speed steels has been limited due to the fact that this material is more brittle than ordinary 18-4-1. On some work minute chipping of the cutting edge takes place more readily. With the shock absorbing properties of a soft brazed tip, however, the brittleness of the solid tool is offset and the added efficiency of the high cobalt high speed steels can be applied to most of the cases where they had previously failed when used in the solid state. It is believed that the 12 per cent cobalt grade will become very popular in tip form. Tests already indicate that on many jobs its performance is very close to the cast alloy tools, with the added advantage of lack of porosity and greater edge strength, making it a better finishing tool than the cast alloy grades. One particular manufacturer who was using a large number of cast alloy tipped tools is now using the 12 per cent cobalt tipped tools and states that the latter are more economical.

While not much data are available on the increase in speed possible with tipped cobalt type H.S.S. tools, scattered field reports indicate that with 8 per cent cobalt tools a 25 to 50 per cent increase in speed is possible, compared with 18-4-1 or molybdenum types, There is one case on record where the speed has been increased 100 per cent and the number of pieces between grinds, 200 per cent, by replacing a tungsten-molybdenum tool of 63 R_c hardness with a 12 per cent cobalt H.S.S. tipped tool of 65 R_c hardness.

Economic Factors

Actually, tipped cobalt grades of H.S.S. are more economical than solid forms of lower base price, besides being superior in performance. A 1 x 1 x 7 in. tool tipped with 8 per cent cobalt H.S.S., for example, sells for $2.50 each in lots of 50, while a solid 18-4-1 tool of the same size costs about $3.14 in the hardened and ground state. A solid 8 per cent cobalt tool costs about $4.60. About twice the tool life can be expected from the tipped tool, compared with solid 18-4-1.

The cost of a 1 in. square solid 12 per cent cobalt tool is about $7 in the hardened and ground state, as compared with a price of $3.25 for a tipped tool of the same grade. Again, there is a substantial increase in tool life at half the cost.

Anyone familiar with the amount of solid tools broken in holders under clamping stresses and the large number of tools cracked in hardening will appreciate the virtue of a tipped tool where such troubles do not exist. This is another economy.

Another advantage of the tipped

H.S.S. tool over the solid tool was recently pointed out to the author by a large user of these tipped tools. This user stated that they considered the tipped tool as an insurance against expensive machine breakdowns caused when a tool shank breaks because of being insecurely clamped or being plunged into the work at the rapid traverse rate. He stated that when a solid tool breaks, the broken part has to fulcrum around the axis of the break to get out of the way and this action often results in the breaking of an expensive head or spindle. When a severe accident happens with a tipped tool, on the other hand, the shank bends out of the way without injuring spindles or heads, etc.

In view of the many advantages of tipped H.S.S. tools over the solid forms, it is no wonder that acceptance of this tool is gaining ground. It is our belief that the method of tipping high speed steel with a soft braze and using blanks of high alloy content or higher hardness, or both, represents a big step forward in the improved application of high speed steel. It puts it in a much more favorable competitive position with respect to the cast non-ferrous materials and even the carbides. Tipping should no longer be considered merely as a conservation measure but as an improved method of applying high speed steel.

Copper in Powder Metallurgy

IN a paper before the April meeting of the Electrochemical Society, J. J. Cordiano of the Hardy Metallurgical Co., New York, pointed out that at present copper plays a most important role in the manufacture of fully 75 per cent of all metal powder parts.

The major portion of the many and varied shapes produced from metal powders are the result of cold pressing the powder in steel dies followed by sintering of the molded part in a protective atmosphere. However, the variations in the types of metal powders, combinations of metal powders, combinations of metal and non-metal powders, compacting pressures, sintering time, sintering atmospheres, post-sintering processing—all these possible variations can be manipulated to produce parts having a wide variety of physical and mechanical characteristics.

A metallic part can be produced from copper powder having an apparent density of 5.5 grams per c.c., a liquid absorption capacity of 20 to 25 per cent, a tensile strength of 10,000 lb. per sq. in—physical and mechanical properties which bear no resemblance to those of solid wrought copper. On the other hand, copper powder can be so processed to form metallic parts which are indistinguishable from similar parts formed from solid wrought copper, and the powder metallurgy products will have a copper content of 99 per cent or better.

The fabricating techniques employed in copper powder metallurgy fall into four general classifications:

1. The production of porous parts such as porous bearings.
2. The production of high strength, high density parts such as tungsten-copper electrode tips.
3. The production of bi-layer and strip material such as steel-backed copper-base bearings.
4. The production of highly porous parts such as filters.

Porous Parts: Parts having a porosity ranging from 5 to 30 per cent can be produced in completely automatic equipment. The metal powder or powder mixture is lubricated by the addition of a volatile powder such as stearic acid, a metallic stearate, or salicylic acid, and charged into the hopper of an automatic tabletting press which compacts the powder mixture at pressures ranging from 20 to 40 tons per sq. in. The pressed pieces are then heat-treated in a continuous-type furnace having a protective atmosphere usually produced from a combusted hydrocarbon gas. The resulting pieces may or may not be repressed or coined as a finishing operation.

High Density Parts: In the production of parts having a high strength and high density, no foreign matter is allowed to contaminate the metal powder or powder mixture. Because of the necessity of lubricating the dies, these parts are produced on a semi-automatic basis. Compacting pressures for these parts ranged from 40 to 100 tons per sq. in. and the sintering cycle is usually longer than for the production of porous parts. In many instances parts are repressed and resintered or annealed to further improve their properties. An alternative method of producing high strength parts combines the pressing and sintering in one operation. However, this method is not being used extensively because of the many production problems involved.

Bi-layer Strip Parts: The manufacture of strip material and bi-layer bearings differs from standard powder metallurgical practice only in the equipment used for pressure application. Metal powder or a metal powder mixture is spread evenly over a cleaned metal strip which in some cases has been plated with a thin coat of tin, copper or nickel. The strip containing the powder is heat treated by passage through a continuous furnace to bond the powder particles to each other and the backing strip. The bi-layer strip is then passed through rolls which compact the loosely sintered powder particles and the strip is again sintered.

Highly Porous Parts: Highly porous parts are produced from spherical copper powder. Small percentages of tin are either pre-alloyed or mixed with copper powder and in some cases, small percentages of a volatile powdered material. The mixture is filled into heat-resistant molds and sintered in the uncompacted condition in a protective atmosphere at temperatures ranging up to 1652 deg. F. Porosities of 50 to 60 per cent are possible by this method of fabrication.

The following description of representative parts made from copper powder or mixtures of copper powder with other metal and non-metal powders illustrate the varied applications of metal powder parts.

Porous bronze bearings are made from mixtures of copper and tin powders. In some cases these mixtures also contain small percentages of graphite. These bearings have an oil absorption capacity of 25 to 30 per cent and have filled a definite need in the bearing industry.

Starter brushes on motors are now being made of a copper-carbon mixture. The use of copper has greatly increased the conductivity and life of these brushes.

Many steel parts have been replaced by metal powder parts made of iron-copper mixtures. These parts, although they do not have the mechanical properties of the steel parts they have replaced, have resulted in a tre-

(CONTINUED ON PAGE 130)

New Methods Feature

WITH by far a record attendance (1095 registration) jamming all available hotel space in Pittsburgh, the 27th annual conference of the Open Hearth Steel and Blast Furnace and Raw Materials Committees of the A.I.M.E. last week featured the major operational problems brought to a head by sustained war production.

Opening the Open Hearth Conference, Armco's L. F. Reinartz, general chairman, pointed out that last year, despite many handicaps, both from a mechanical and a personal standpoint, the blast furnace and open hearth operators surprised the world by the most remarkable tonnage record ever produced. About 88,872,598 tons of steel ingots and castings were made in 1943.

Due to the shortage of natural gas fuel during this last winter, and the transportation difficulties in delivering fuel oil supplies to the Eastern Coast for Army and Navy use, as well as the resultant shortages in the steel industry, great interest has been manifested in the entire fuel problem of the steel industry. A lively and worth-while discussion of this important subject may be expected, said Mr. Reinartz. A new plan for making fuel oil better adapted to open hearth use will be presented. Colloidal fuel has some interesting possibilities now and in the post-war days.

Metallurgical problems connected with the manufacture of special quality steels for war purposes will be carefully considered in two sessions of the Conference. Prominent metallurgists and operators will give those attending the benefit of experiences gained during the last two years.

In the quality session the engineers will discuss bath temperature measurements, deoxidation practice, segregation problems, as well as a study of residual metals.

For the first time in the history of the Committee, said Mr. Reinartz, steel plant masons will have a separate meeting of their own. It is believed many ideas which will help reduce furnace repair out-time will be developed. This is important because furnaces down for excessive repairs cannot produce their fair share of the tonnages required for victory.

According to Mr. Reinartz, of particular interest will be a discussion of progress made in the resurrection of the suspended roofs. Progress in the use of basic brick and development of new refractories will be reviewed. Special high alumina silica brick may improve roof life considerably.

Discussion of operating problems will again bring up for consideration many ways to improve scheduling, production, and the effect of handling personnel in the best way.

For the first time the use of cupolas in open hearth operations will be discussed.

At the annual banquet, Thursday night, J. L. Perry, president of the Carnegie-Illinois Steel Corp., addressed the conference, and Henry Roemer, chairman and president of Sharon Steel Co., was the toastmaster. The annual McKune Award was presented to James W. Halley and George L. Plinton, Jr., metallurgists for Inland Steel Co., for their paper "Relation of Open Hearth Practice to Segregation in Rimming Steel." An unscheduled honorary award was given to William O. Philbrook and Alexander Jolly, Jr., metallurgists for Wisconsin Steel Works, for their paper on "A Survey of Slag Control Methods."

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Residual Copper, Tin and Nickel Feature Quality Control Problems

The steel industry has been faced with a number of quality problems during the war production period, according to T. S. Washburn of Inland Steel Co. The problems discussed by Mr. Washburn were those dealing with quality as affected by raw materials and open hearth practice and the relation of quality control to mill schedules.

One of the principal problems has been connected with the variable composition of raw material used in the charge, particularly the scrap portion. It is necessary in many grades to maintain certain maximums with respect to impurities and alloying elements. The increasing contamination of scrap has resulted in more difficulty being encountered with respect to this feature of quality control.

As an example of the increasing contamination of scrap, the graph in Fig. 2 shows the average composition of bath tests from heats charged with 45 per cent hot metal—55 per cent scrap. These figures represent data from only one plant but are significant as showing the trend. It will be noted that there was a general increase in the residual copper during the period covered by these data, and that a pronounced increase occurred in the years 1942 and 1943. A similar trend is shown by nickel and tin. Since this particular plant is not a producer of alloy steels in any quantity, the residual chromium and molybdenum in the bath is normally low, although a moderate increase may be noted in 1942 and 1943. These data are probably not representative of the practice at many plants where alloy scrap is used in large quantities.

From the standpoint of quality control, this increasing content of residual elements presents a problem on a number of grades, according to Mr. Washburn. For example, it is considered desirable to maintain the copper content at a low level in deep drawing quality strip steel, and at one time the Inland plant had established a maximum copper limit of 0.060 per cent.

In Fig. 3 is shown the relation of the maximum copper limit to the percentage of heats tapped in two monthly periods. It will be noted that in the case of a 0.060 per cent maximum copper only 33 per cent of the heats tapped in May, 1942, would meet this requirement. In 1943, the situation with respect to residual copper improved, and in March of 1944, 78 per cent of the heats would meet a 0.060 per cent maximum. In either case, however, the percentage of heats diverted if ordered to such a maximum would result in too many diver-

Open Hearth Meeting

. . . Changes in residual alloys due to current scrap practice, combustion characteristics of fuel made up of powdered coal and oil, and a variety of data on use of cupolas to supply hot metal to open hearths, are features of the open hearth sessions.

sions to enable the open hearth to meet mill schedules satisfactorily. As a consequence, it was necessary to raise the maximum copper requirement on this grade to a 0.080 per cent maximum. Even with this revision, however, it can be seen that in March, 8 per cent of the heats tapped would have to be diverted from this specification.

In addition to the copper maximums just cited for deep drawing quality, there are other grades which limit the percentage of this element, such as certain qualities of tin plate which are still specified to a 0.060 per cent copper maximum. These averages do not present the complete picture with respect to the problem of very high residual copper in heats which occur periodically during a month's production and which must be diverted. For example, a maximum of 0.15 per cent copper is desirable on any steel over 0.30 per cent carbon, due to the occurrence of copper checking on the surface of the product which begins to develop at copper contents between 0.15 and 0.20 per cent and becomes a difficult defect to control at still higher copper contents.

The problems encountered with high residual tin were also a factor in quality control, particularly during 1942 when the industry was required to absorb large quantities of improperly detinned scrap. In this period many plants were confronted with the problem of using heats often containing tin as high as 0.10 per cent and occasionally as high as 0.30 or 0.40 per cent. It was found necessary to divert heats over certain maximums, depending on the grade being made, and during a period of several months these diverted heats were an important problem from the standpoint of meeting mill schedules. Currently, the tin situation has improved appreciably, and only an occasional diversion is necessary for higher tin contents.

It was necessary for many plants to modify their charges and to go to higher percentages of hot metal. This increase in the amount of hot metal used in the charge was normally associated with the use of ore in the charge and a flush slag practice. This change in charging practice presented certain difficulties in quality control, particularly during the initial stages in any one shop. During this initial period, it was necessary for the operating crew to adjust themselves to the practice. In this period of adjustment, there was an increase in the percentage of off-melts; but with experience, the off-melts leveled off to about the same figure as for scrap practice. The move to high metal practice also necessitated modifications in slag control methods since the run-off slag presented new features with respect to maintaining satisfactory composition for the finishing slags. The decrease in the weight of finishing slags resulting from flush practice also presented more of a problem with respect to temperature control. With a lighter blanket of slag on the heat, the temperature changes are more rapid. As a consequence, it is necessary for the operators to become accustomed to this feature in gaging their finishing temperatures. Another factor in the production of flush heats is the more rapid carbon drop obtained with this type of charge. This presented more difficulties from the standpoint of meeting specified carbon ranges.

In general, however, the introduction of flush practice has not resulted in any significant increase in diverted heats or off-heats on account of analysis, after the furnace operators have been trained to this type of practice. In some respects, the flush practice has been advantageous, as noted above, since this type of charge is associated with lower contents of residual elements. There are still some grades which are not made on flush charge heats, principally due to the lower residual manganese associated with this type of charge.

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Construction and Operation of Colloidal Fuel Plant Described

A REPORT on the construction, operation, and performance of an experimental plant for mixing pulverized coal and fuel oil for open hearth use at the East Works plant of American Rolling Mill Co., Middletown, Ohio, was presented by Harold Flagg, combustion engineer. This plant was built at the instance of the Petroleum Administration for War and by collaboration of the Office of Production Research and Development, WPB, and Armco.

The experiment was undertaken with the following objectives in mind:

(1) Conservation of fuel oil resources by partially substituting coal for oil.

(2) Enrichment of fuel oil with carbon to offset the change in combustion characteristics resulting from the lighter oils in use for the past 18 months.

(3) Production of a fuel that would burn progressively over the length of the furnace hearth so that steel melting can be accomplished with less destruction of furnace refractories, greater production, and lower fuel consumption.

(4) Development of higher flame luminosity by means of increased carbon concentration which should increase the rate of heat transfer to the bath.

(5) Stabilization of fuel supply by correction of variations in oil as it comes from the refineries.

A diagram of the equipment used is shown in Fig. 1. Operation of the plant was started Feb. 14, 1944. The original assumption was that the open hearth fuel oil demand would be sufficiently steady so that the coal plant could be operated at constant output and incidental variations due to reversal of furnaces and tapping of heats would be averaged out in the

open hearth tanks. These tanks are ordinarily maintained at about 8000 gal. Storage and the hourly consumption averages 340 gal. per hr. per furnace, so that the tanks hold a minimum of 3 hr. supply for full plant operation of eight furnaces. On this basis it was expected that the coal mixing plant could be operated by the open hearth pump men whose duties are concerned mainly with the cooling water and fuel oil circulating systems. Experience soon proved that this set-up was not practical.

The float operated oil control valve could not be used since it backed up oil on the mixing system so that manual control of oil feed was necessary. This had been anticipated but was not considered serious since the pump men were in the habit of checking tank level at least once each hour. However, within three days there was an occasion where the oil feed was increased beyond the capacity of the collodial fuel pump and an oil spill resulted. More aggravating still, were repeated occasions when the oil feed was cut so low that the coal oil mixture was so thick that the pump would not lift it and the whole mixing system became plugged up with a sticky mess.

Correlation of the many factors which influence performance of the plant has been somewhat difficult so that it has not been possible to maintain mixed coal and oil supply to the open hearth as evenly as is desirable. These factors may be enumerated as follows:

(1) Fuel oil feed
(2) Type of coal
(3) Size of coal
(4) Wetness of coal
(5) Atmospheric temperature and humidity
(6) Air preheat
(7) Amount of air circulated
(8) Amount of air vented
(9) Amount of coal admitted to the pulverizer.

Experience with air preheat has been interesting. This item was overlooked in the original layout and as an expedient use was made of a 600,000 B.t.u. direct gas-fired air heater which was available, operated by a temperature controller. The installation worked all right except that the capacity was at least ten times as much as required with the result that the pulverizer coked up before the system had had time to heat up to a balance. This heater was replaced by a 40,000 B.t.u. steam heated unit heater which functions very well. Apparently it is better to have the heater undersized than oversized. At 2000 lb. coal per hr. and 40 deg. F. air, the present heater will keep the outgoing air at about 1250 deg. F. which seems to be sufficient.

One of the chief objectives was to add as much carbon to the fuel as possible so the first consideration was to use a coal with the highest possible carbon content or, in other words, with low volatile matter content. Ash content was also a matter of concern since it was assumed that the entire amount of coal ash introduced would be added to the accumulation of flue dirt in checkers and flues, this being an important limitation on the length of furnace campaign. The flue dirt accumulation over a furnace campaign may average some 85 lb. per furnace hr. For average oil of 340 gal. or 2720 lb. per hr. and 10 per cent coal by weight, each 1 per cent of ash would add 2.72 lb. ash per hr. or an increase in flue dirt of 3.2 per cent for each 1 per cent of ash in the coal. This 5 per cent ash coal would increase the amount of flue dirt 16 per cent. It follows that coal with the lowest ash content obtainable should be used.

Low sulphur content is desired. Sulphur in the fuel oil supply is at present above 0.9 per cent so that low sulphur coal serves to reduce the

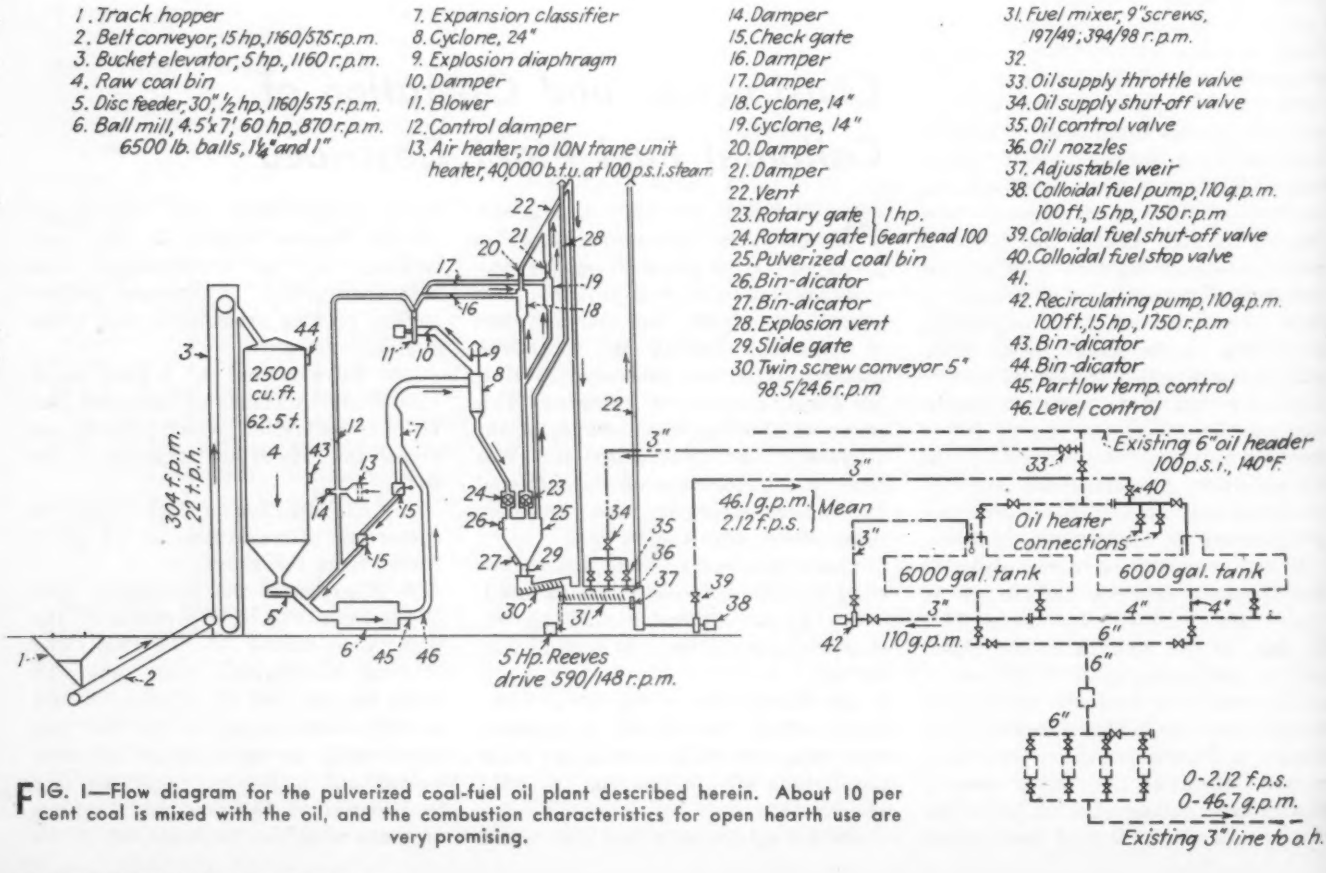

FIG. 1—Flow diagram for the pulverized coal-fuel oil plant described herein. About 10 per cent coal is mixed with the oil, and the combustion characteristics for open hearth use are very promising.

amount of sulphur introduced into the furnace.

Moisture content of the coal has a critical influence on output, fineness of grinding, and continuity of operation. Dry coal is almost a necessity for successful operation. Use of covered hopper cars for this coal service is much to be desired.

Grindability and coal size are both important with respect to coal fineness and pulverized coal output.

The low volatile coals in the slack sizes from the West Virginia field satisfy these requirements very well except for ash content. After trying several different coals, all of which worked satisfactorily except that ash content was high, there was secured a ¾ in. slack of analysis as follows: Volatile matter 19.76 per cent, fixed carbon 75.16 per cent, sulphur 0.61 per cent, ash 5.08 per cent, heating value 14830 B.t.u. per lb., dry basis.

The addition of so small an amount of coal as 5 per cent had an immediate effect on the appearance of the flame. Without coal the flame tailed out at the third door and the furnace ran savagely hot. After the addition of coal, the flame was clearly visible across the entire length of the furnace and over the outgoing breast and the roof runs distinctly cooler. With such a condition a free oxygen content of 4 per cent has been found in the outgoing gases at the end wall at a heat stage when bath action was quiet. Even during an active lime boil 1 per cent oxygen has been found. Heat times, even with this excess air, are at least average if not somewhat faster than average.

Punishment of outgoing ends has been severe and steps must be taken to alleviate this condition. Already the fuel rate per hour has been decreased 10 per cent and the burner nozzles have been changed from 2 in. xx to 1½ in. xx pipe. Compressed air is being introduced into the atomized fuel stream to shorten the flame still further. Obviously this reduction in fuel rate must result in lower fuel consumption so the melting rate can be maintained and experience to date indicates that this is the case. Much remains to be done on furnace combustion before there is any satisfaction that this instrument which so evidently has increased the intensity of heat transfer has been properly harnessed.

Armco is not in position to report as to the effect of the coal-oil fuel on checker deposits at this time. The only clean-out was on a furnace which operated on coal-oil about three weeks out of a five-months campaign, which is hardly sufficient to justify any conclusions.

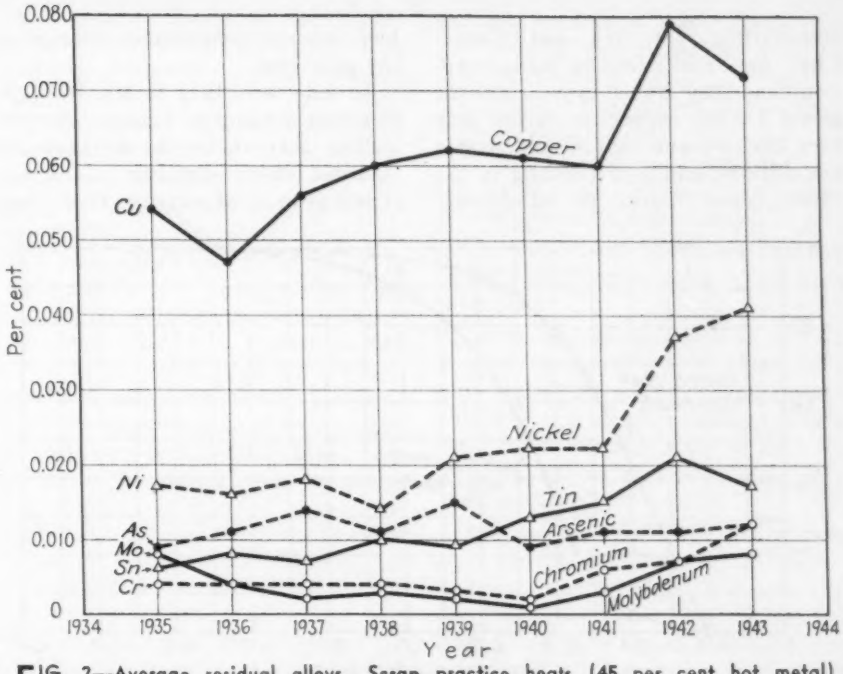

FIG. 2—Average residual alloys. Scrap practice heats (45 per cent hot metal) 1935-1943.

No attempt has been made up to this time to figure operating cost on the plant. Continuously running motors total 111.5 hp. in capacity and the actual load is probably about 80 hp. Present labor cost is high but we feel certain that this charge can be mostly eliminated as soon as the proper controls are installed and their performance worked out. Sufficient margin exists between the costs of fuel oil B.t.u. and coal B.t.u. to carry all the cost of pulverizing and still show a saving for coal.

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Use of Cupola Iron in Open Hearth Furnaces

WHEN all of the material and processing costs are summed s up, the costs of producing steel ingots in fully integrated iron and steel plants are probably $5 or more a ton lower than in any cold metal plant, due principally to the economic advantages accruing from the use of a 50 per cent hot iron charge commonly debited to the open hearth cost sheets without selling or administrative costs or profit. In addition the integrated producers usually have lower operating costs as the results of larger operations and diversification of products, according to a report given by William C. Buell, Jr., steel plant consultant for Arthur G. McKee & Co., Cleveland.

It is believed the designers of the selling price structure of the steel industry have never taken into account the 15 per cent tonnage participation of the non-integrated ingot producers.

The hot metal practice of the integrated steel producers give them four major economic advantages, as well as several lesser advantages over the non-integrated producer. The major advantages are:

(1) A substantially lower cost of the metallics of the charge.

(2) The ability to adjust the percentage of iron in the charge so as to exert a measure of control over the price and quality of such purchased scrap as may be used (out for the duration).

(3) The inclusion in the charge of a considerable quantity of iron as low cost ore which displaces a like amount of higher priced metallics.

(4) A substantial savings in conversion costs resulting from the use of the pre-melted iron component.

In their efforts to bring production costs of ingots more into line with those of the integrated producers, the non-integrated producers have looked with longing eyes at the hot metal practice of the larger companies and in the past few years some few efforts have been exerted to develop such a practice through the media of scrap pre-melting furnaces.

The two original pre-melting cupola

installations (Sterling and Kansas City) were authorized on the assumption that they would prove economic media for the conversion of the then very low cost and usually undesirable agricultural scrap, originating in the West-Central States, to satisfactory melting furnace metal. After operations began it developed that the most important function of the process was a means to greater unit steel furnace production.

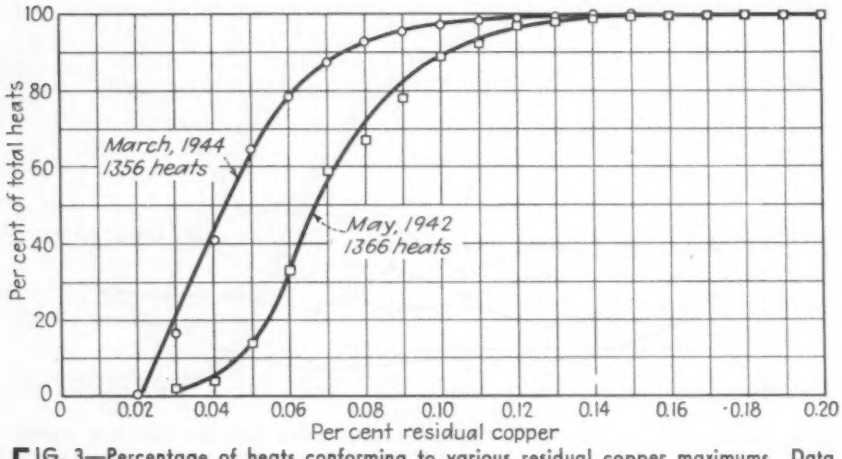

FIG. 3—Percentage of heats conforming to various residual copper maximums. Data based on all heats produced during two different periods at No. 2 open hearth.

The later plants, those at Bridgeport and Alton and the government sponsored plants at Detroit and Warren, were conceived primarily for the purpose of accomplishing increases in unit furnace production at the bequest of W.P.B.

Of the total of six pre-melting furnace installations as auxiliaries to steel ingot production, three were designed as adjuncts of electric furnaces and a like number of open-hearth furnace operations.

Four of the installations are conventional drop bottom types of cupola and two have modified blast-furnace types of bottoms.

Four of the installations have the familiar cupola open top and two have semiclosed tops.

In the case of four of the installations the cupolas are blown out and the hearth and bosh relined every two or three days, while at two plants linings with water cooling have withstood several weeks' operation.

In at least one plant, basic linings have been tried and operating improvement has been indicated.

All of the installations included arrangements for desulphurizing the iron through ladle additions of sodium compounds.

Two of the installations included bessemerizing equipment.

Mr. Buell pointed out that with one exception he had seen all of the pre-melting installations in operation and had received information concerning the practices.

To date, according to Mr. Buell, he had seen nothing to indicate the pre-melting furnace as now designed and operated offers anything in the way of reduced cost of metallics to the non-integrated ingot producer. Bear in mind that to be of worth during a period when high capacity production will probably be unnecessary, the cupola must operate competitively against the blast furnace, and to do so will be obliged to convert perhaps $5 miscellaneous scrap to the equivalent of $12 blast-furnace metal.

One interested operator gave a conversion cost of about $5 for cupola iron, but in Mr. Buell's opinion, this was a very optimistic figure. It is his present impression that double this figure or more would come nearer representing the true conversion cost of present practice. In a good order of modern practice the blast-furnace cost for the conversion of a ton of pig iron is about $1.50 after gas credit.

There is no question of the virtue of cupola iron as a means of increasing unit furnace production, said Mr. Buell. Open hearth operators say time of heats are reduced by from 20 to 30 per cent and the electric furnace operators claim time of heats are cut in half and electric current input by a third. Under present war conditions, when tonnage production is the prime factor of operations and there is little or no consideration of economy as such the pre-melting furnace has proved an invaluable aid, but when economy of operations again becomes the prime factor, the pre-melting furnace of present design and with existing operating practices has but little chance to prove of worth.

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Armco's Practice with Cupola Hot Metal for Open Hearth Furnaces

IN describing the use of cupola hot metal in steel making, Hughe Barnes, consulting engineer, Armco, pointed out that many small and moderate size steel plants do not operate blast furnaces and their open hearth furnaces are seriously handicapped by having to operate on an all cold charge.

To meet this situation the Sheffield Steel Corp., Kansas City, installed a cupola melting shop in 1938 to supply hot metal for their four 100-ton open hearth furnaces. At this plant, iron ore and coke are not locally available and no pig iron is produced within several hundred miles. Light steel scrap is available in quantities and some cast iron scrap can be obtained. Very little heavy melting scrap is available. The open hearth furnaces were run on a scrap and coke process, with the use of the minimum amount of pig iron. The use of so much light scrap prolongs open hearth charging. Three or four drags of charging buggies and about 8 hr. time were required to get the entire charge into the open hearth furnace. This soft steel charge with little pig iron made a dead melt with little action. These heats were hard to work and required about 13 hr. for a 100-ton heat.

The advantages of hot metal under these conditions are greater than those in a cold metal open hearth shop using pig iron in normal quantities in the charge. The cupola is well adapted to melting light scrap, as the charging opening at the top is large, permitting a reasonable weight of scrap per buggy, and the coke prevents the hot scrap from settling together into large lumps which melt slowly. The high sulphur usually present in cast scrap can be removed more effectively under the reducing conditions following the cupola than under the oxidizing conditions in the open hearth.

It was also desired to increase the capacity of this shop, and building additional open hearth furnaces would have introduced charging difficulties, as all of the scrap must be brought in at one end and the large number of buggies of light scrap caused congestion on the charging floor, even with four furnace operation.

The cupola installation consists of two 114-in. shell diameter cupolas

lined to 72-in. inside diameter, located at the end of the open hearth, approximately in the line of open hearth stacks. The cupola shaft is 25 ft. high and the bottom is 8 ft. above yard level to permit dropping the bottom when the cupola needs relining. The cupolas have open tops with separate hoods to take off the waste gases. The top is fitted with a cast iron funnel and liner to protect the brick lining from the wear and tear of charging. Each cupola has 16 tuyeres 3x4 in. with individual blast gates and sight holes.

Generally, only one cupola is operated at a time while the other is down for relining. Each cupola is blown by a Roots Connersville positive pressure lower of 15,000 cu. ft. per min. capacity, at 22 oz. discharge pressure, driven by a 100 hp. constant speed motor. Each blower is equipped with a Foxboro air weight controller which delivers a constant weight of air to the cupola, irrespective of changes in atmospheric temperature and pressure.

The cupolas are top charged by a skip hoist with 30 in. gage buggies having a capacity of 90 cu. ft. equivalent to 5000 lb. of light scrap. Buggies are loaded on track scales in the stock yard with a manget on a 10-ton stock yard crane. The required coke and limestone are loaded into each buggy by hand. A motor driven transfer car shifts buggies between the track scales and the cupolas. The cupola stock yard is a 100 ft. wide, 268 ft. long extension to the old open hearth stock yard at the side of the open hearth building.

The cupolas are continuous tap, with a slag trap in the runner which discharges the slag into an inclined trough where it is sluiced into a water tank and granulated.

The hote metal is poured from the holding furnace into 35-ton capacity transfer ladles resting on platform scales, for transfer to the open hearth furnaces as needed. The supola metal is desulphurized by adding soda ash to the transfer ladle while it is being filled from the holding furnace. A sliding hood and exhaust fan carry off the fumes resulting from the soda ash reaction. The resulting slag is removed by wooden rabbles handled from an extension to the charging floor.

These cupolas have operated on a charge varying from all cast iron scrap to one-third cast and two-thirds steel scrap. The best operation occurs with the all cast iron charge, and increasing the percentage of steel scrap reduces the rate of production, increases the coke consumption and reduces the life of the cupola lining. For the year 1943 the average metallic charge was 56.15 per cent No. 2 heavy melting steel scrap, 40.24 per cent cast scrap and 3.61 per cent pig iron. The average coke consumption was 34.9 lb. a gross ton, equivalent to 15 per cent of the metallic charge. The limestone for fluxing out the impurities averaged 71.73 lb. per ton, or 3.1 per cent of the charge, and the soda ash added for desulphurization in the transfer ladle averaged 13.87 lb. per ton of hot metal. The average yield was 96.46 per cent.

A typical analysis of the cupola metal is as follows: Total carbon, 2.75 per cent; Mn, 0.40; Si, 0.80; P., 0.40; and S., 0.14.

The hot metal after desulphurization has about 0.50 Si and 0.070 to 0.080 S. Additional desulphurization can be obtained by successive additions of soda ash and the sulphur can be reduced as low as 0.020 if necessary. Each soda ash treatment will cut the sulphur content approximately in half.

If the desulphurized metal is much below 0.50 Si it becomes thick and viscous and hard to pour. Silica sand added to the cupola charge to increase the silican in the metal tends to blow out the open top of the cupola. Higher temperature to reduce more silica to silicon increase the coke consumption and the destruction of the cupola lining. It has not been found practical to make high silican iron in the cupola with a high steel scrap charge.

The total carbon varies with the cast scrap in the charge and runs up to 3.25 per cent with an all cast scrap charge. The manganese can be adjusted to ope nhearth requirements by additions of spiegeleisen or ferromanganese. Increasing the manganse by additions of manganese ore was not very satisfactory.

Hot metal temperatures are as follows: Cupola runner, 2750 deg. F.; into holding furnace, 2700 deg. F.; out of holding, furnace, 2550 deg.; into open hearth, 2500 deg. F.

Normally, metal at this temperature is fluid and pours well with little ladle skill.

These cupolas are rated at 25 tons per hr. on a pig iron charge. They have melted 20 tons per hr. on a scrap charge with a large percentage of cast scrap. The average melting rate for 1943 on the mix previously given was 15.23 tons per hr.

The cupola lining in the melting zone for about 5 ft. above the tuyeres has an average life of 65 hr. Old silica open hearth roof brick bats have been found to be the most satisfactory material for relining this part of the cupola. The upper part of the cupola is lined with clay cupola brick and is quite durable. The outside shell around the melting zone is sprayed with water to protect the shell and lining, but no water cooling isu sed inside the shell.

This metal has worked well in the open hearth furnaces from the start. The first hot metal heat was 2 hr. shorter than the preceding cold metal heat on the same furnace. With normal grades of scrap available, average practice was 13.07 hr. per 110 tons for cold charge and 9.42 hr. with 40 per cent hot metal, or an increase in rate of production af about 38 per cent.

This reduction of 3½ hr. in time of heat practically all occurred in time of charging. With cold metal the charging time varied from 7½ to 8¾ hr., which was reduced to 4 or 4¼ hr. with hot metal. It required about the same time after charging to finish a hot or cold metal heat. The average time of heat for 1943 was 35 per cent hot metal was 10.85 hr., due to poorer scrap and other changed conditions. No cold metal heats were made last year, so a direct comparison of hot and cold charge under present conditions is not available.

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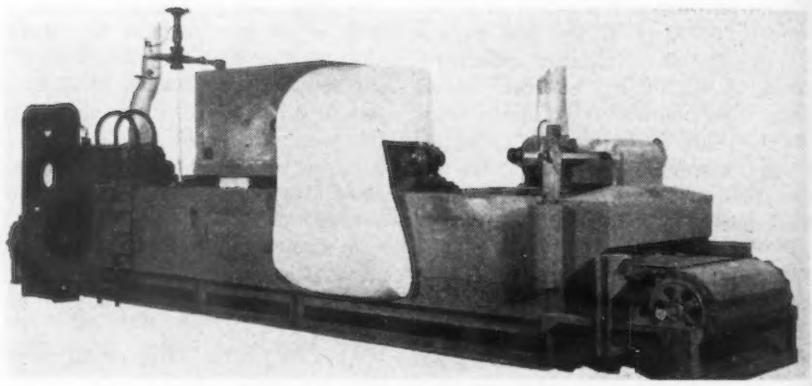
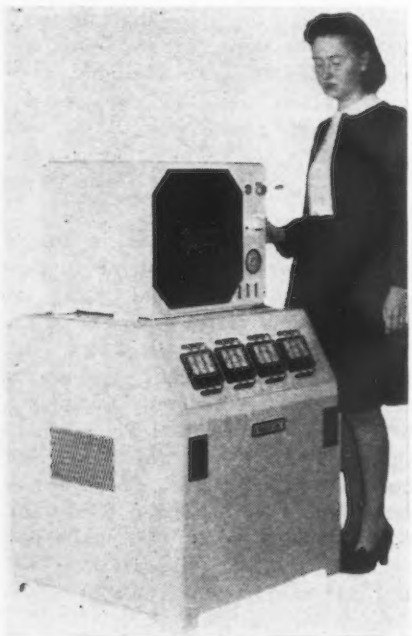
New Equipment . . .

Heat Treating and Process Control

Recent developments in induction heating equipment, heat treating furnaces, process control and analyzing instruments are described and illustrated in the following pages.

THE OHIO CRANKSHAFT CO., 3800 Harvard Avenue, Cleveland 1, has put out the 7½ kw. output Tocco Jr. induction machine, which features a work unit separate from the power unit. The mobile top can be placed some distance from the power unit. A wide range of induction heating for brazing, annealing and heating for forming and hardening small parts is provided. The unit is equipped with a vertical type 220/440 volt, 3 phase, 60 cycle motor generator set providing 9600 cycles of high frequency power.





Continuous Draw Furnace

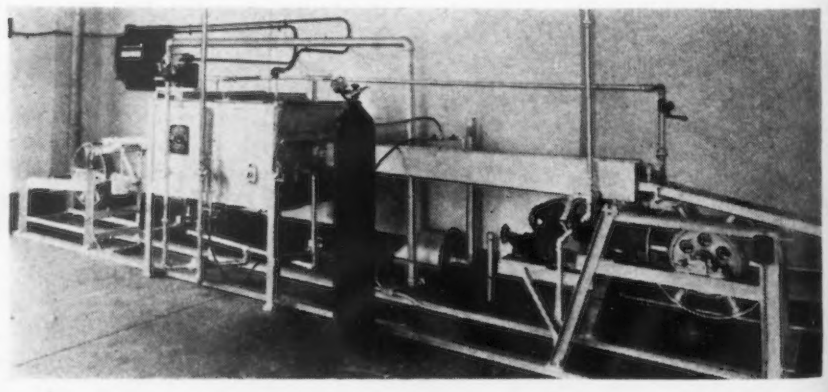
DESIGNED for stress-relieving of armor-piercing shot, the continuous draw furnace illustrated is built for temperatures up to 900 deg. F. and maintains absolute temperature uniformity ±3 deg. throughout the length, width and height of the work zone. As a result of high air velocity and rapid heat transfer, the load is continuously brought up to temperature in a short time. The unit is gas fired, but oil or electric heat equipment is available. It can be designed for automatic loading and unloading. *The Industrial Oven Engineering Co.*, 11621 Detroit Avenue, Cleveland, is the builder.

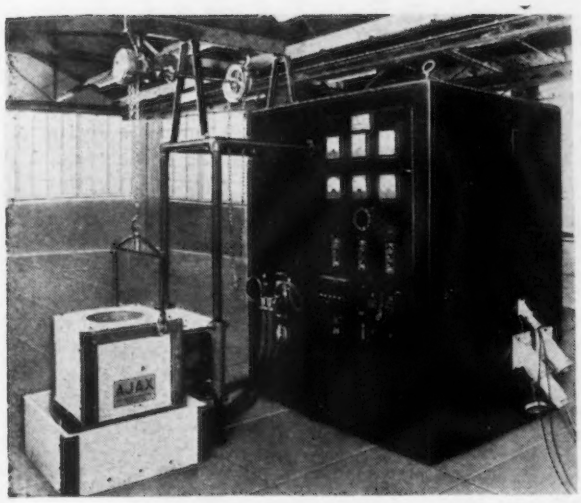
Annealing Furnace

A SMALL gas-fired furnace for continuous, automatic brazing of copper pieces, silver soldering, sintering or bright annealing of metal strips, bands and miscellaneous formed objects that require a uniformly bright high surface finish has been put on the market by *W. S. Rockwell Co.*, 50 Church Street, New York 7. Heretofore non-oxidizing furnaces of this kind have been electrically heated and can be so arranged in this unit. Since the gas consumption to heat a furnace of this size is not enough to warrant the use of an atmosphere generator, controlled reducing atmosphere is maintained in the muffle and cooling chamber by introducing hydrogen drawn from a cylinder at a controlled rate.

Induction Furnace Unit

TWO hundred lb. of uniform, homogeneous brass can be melted and cast in 50 min. with the 50 kw., cubicle type Ajax-Northrup lift-coil induction furnace unit, according to *Ajax Electrothermic Corp.*, Ajax Park, Trenton 5, N. J. It is adaptable to small foundry practice. The charge is placed in an ordinary crucible and the lift-coil furnace is lowered around the crucible by means of a hand hoist. When the charge is molten, the furnace coil is lifted, the crucible is





picked up in a shank and poured. Power is supplied from a 3000 cycle motor-generator set.

Tempering Furnace

A COMPACT but heavy duty oil bath furnace, Model 128, has been announced by the *Stanwood Corp.*, 4819 West Cortland Street, Chicago 39, for tempering or drawing small parts to relieve stresses set up by quenching or to bring about a change in grain structure. Gas fired,

these units are heated by immersion tubes and thermostatically controlled. They are available in a variety of sizes. Square or cylindrical baskets for holding parts to be tempered or drawn are available.

Thermocouple

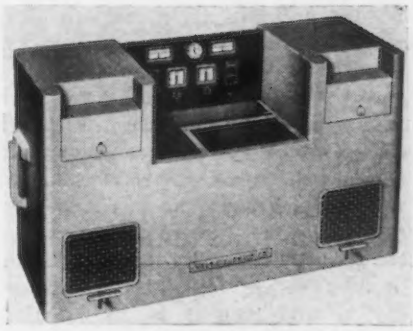
A NEW type thermocouple, the Carbucouple, designed and constructed for cyanide carburizing in the heat treating and allied industries, is being introduced by the *Brown Instrument Co.*, a division of Minneapolis-Honeywell Regulator Co., Philadelphia. It features a uniquely designed "hot" leg, consisting of an outer tube which has been heat treated and surface conditioned by a special process, and an inner ceramic tube to protect thermocouple accuracy. The Carbucouple is said to have at least twice the life of thermocouples made with nickel tubes and is more sensitive or responsive.

Refractory Coating

A REFRACTORY coating, applicable to foundry and heat treating fixtures to prolong their life under intense heat, has been developed by the *Neo Mold Co.*, Cleveland. Known as Neo-Kote-P 101, it is said to be especially effective when applied to magnesium and aluminum melting pots, core baking boxes, loading racks for high-temperature furnaces and heat treating fixtures of various types. The coating may be applied after only blast cleaning and can be renewed if the fixture is re-treated before the steel has started to scale. Treated pots are claimed to last 75 to 90 heats.

Combination Heat-Treat Unit

DESIGNED to do a complete heat treating job, a combination unit has a high temperature hardening furnace on the left, quench tanks in the center and a recirculating draw furnace on the right. Built by the *Waltz Furnace Co.*, 2462 Gilbert Avenue, Cincinnati 6, the unit is made in three sizes. The temperature in the hardening furnace is automatically controlled by an indicating pyrometer within a range of 1350 to 2300 deg. Both water and oil quench tanks are provided, the former surrounding



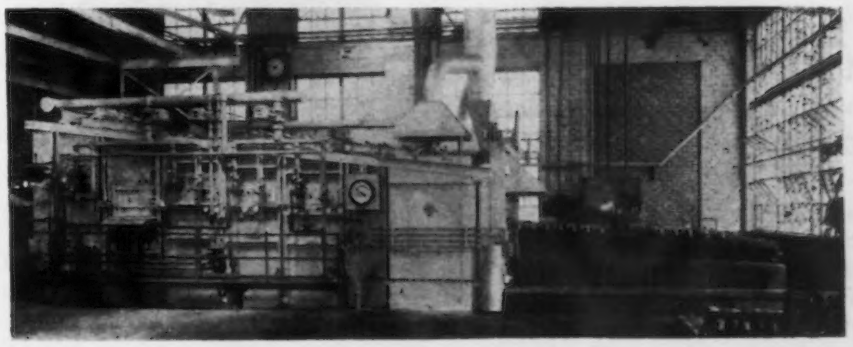
the latter through double walls. The recirculating draw furnace has a range of 250 to 1100 deg., automatically controlled.

Industrial Thermometer

A ONE-PIECE industrial thermometer has been tested in the field by *Taylor Instrument Companies*, Postal Unit No. 1 (P. O. Box No. 110), Rochester, N. Y. The shallow case makes the mercury column visible through a wider angle of vision. The chromium-plated bezel fits snugly into the grooved case so that the thick glass front is held securely against four wavy tension springs which are fastened under the scale. The new instruments are equipped with easy-reading Binoc tubing. They will be furnished in many combinations of straight and angle stems, with threaded or union connections, and in many standard temperature ranges within the limits of —40 deg. to +750 deg. F. Standard scale lengths are 7 and 9 in. Numerals stand out sharply against a contrasting background.

Bar Heating Furnace

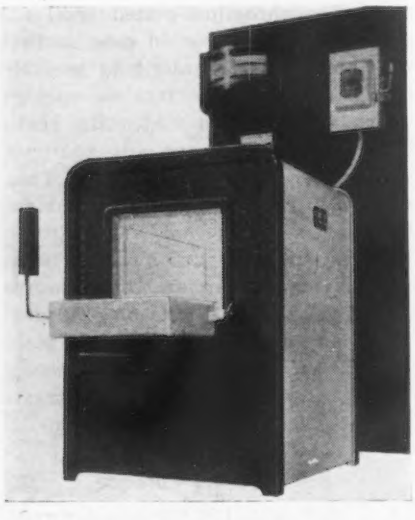
A CONTINUOUS furnace designed to synchronize the desired rate of charging and the rate of copper bar feed to the mill has been put out by *W. S. Rockwell Co.*, 50 Church Street, New York. The furnace illustrated is designed to handle two rows of 63 wire bars of 250 lb. per row each, in a 1¼ hr. heating time. The handling method consists of a



20 ft. charging table on which the bars are placed, an oil-operated hydraulic pusher mechanism and two rows of water-cooled skids for each row of bars in the furnace. The rate of pushing these bars into and through the furnace is so coordinated with the needs at the discharge end that while the pusher moves forward the feed table is being loaded. As the pusher reaches its extreme forward motion and returns to its starting point to advance the new full load, no time is lost in the rate of delivery at the discharge end.

Muffle Furnaces

FOR heat treating small parts, drawing or tempering small lot runs, normalizing or annealing, or preheating for subsequent hardening of high speed steel, two sizes of small electric muffle furnaces have been built by the *Cooley Electric Mfg. Corp.*, Shelby and Daly Streets, In-



dianapolis. Elements are of the embedded type, which afford protection to the element wire from atmospheric attack. Four interlocking, rectangular elements form the interior of the chamber. The furnaces are automatically or hand controlled. They are offered in two sizes with chambers 8 x 6 x 14 in. deep and 10 x 6 x 18 in. deep.

Induction Heating Coil

QUICK, localized heat treatment of ordnance parts is made possible by the induction heating coil developed by *Ajax Electrothermic Corp.*, Ajax Park, Trenton 5, N. J. The focus inductor, designed to concentrate the heat in small areas on both walls of the part, is of modified helical shape. The two walls of the part fit between the coils. Area of maximum heat is concentrated at the

center of the coil at the areas to be hardened. Heating time is 35 sec. at a frequency of 35,000 cycles per sec. Power source is a 6-kw. spark gap converter.

Foundry Facing Binder

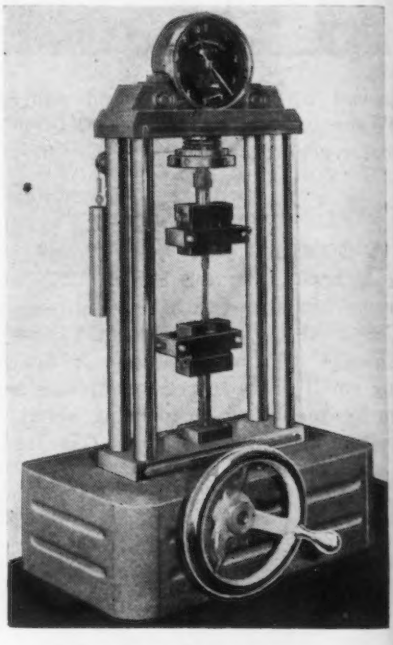
A DRY type foundry core and facing binder of hydrocarbon base has been announced which is said to save binder and new sand expense and produce cleaner castings. On ignition, Bondite produces a carbon type gas that covers surface grains, giving them a protective coating against metal action, prolonging the life of any type of silica sand by preventing fusion and breakdown. It can be used successfully in old sand. Cores and facing sand made with Bondite are said to show more permeability, allowing finer grained sand to be used with resulting smoother castings. It weighs 4 lb. per gal. and is available from the *Bondite Corp.*, 2325 East 38th Street, Los Angeles 11.

Combustion Tube Furnace

A SINGLE tube furnace, the CF-1, has been designed by *Lindberg Engineering Co.*, 2444 West Hubbard Street, Chicago 12, for fast determination of carbon and sulphur as well as gravimetric determination of carbon and all alloy steels, including stainless and heat resisting steels. Temperatures obtainable for continuous operation are up to 2500 deg. The units are equipped with three adapters for interchangeability of standard combustion tubes, 1, 1¼ and 1½ in. o.d. A fourth tube, 2 in. o.d., can be used without an adapter.

Tensile Tester

BRAZED joints, spot welds, standard rounds or flats and springs may be rapidly analyzed for relative strength on the portable tester put out by *W. C. Dillon & Co., Inc.*, 5410 West Harrison, Chicago 44. The unit has seven intermediate and interchangeable indicators up to 10,000 lb. The holder design for standard V-wedge serrated grips permits rapid specimen insertion and removal, by sliding outer holder supports being raised or lowered. The machine, while hand driven, can be motorized.



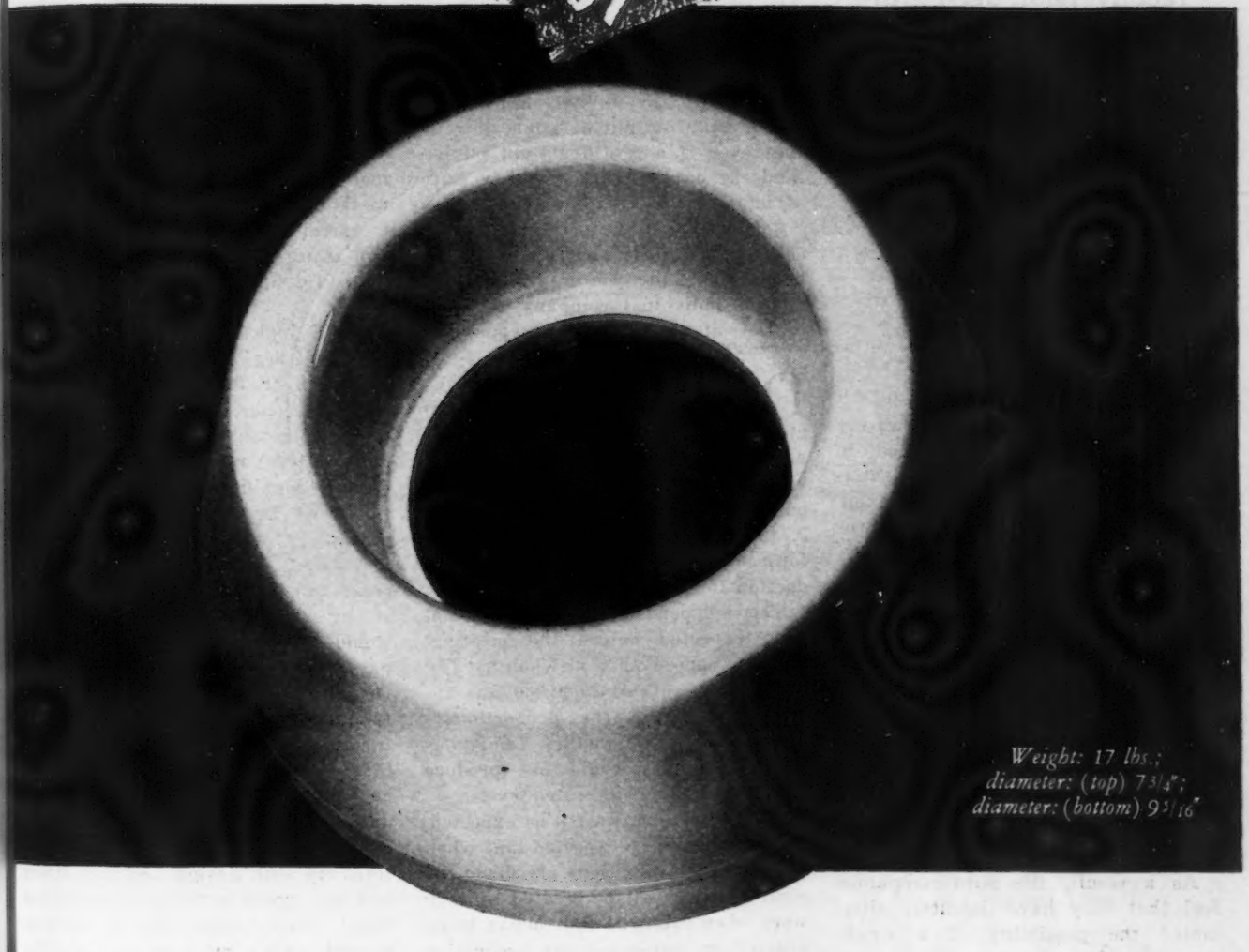
X-Ray Illuminator

A HIGH intensity illuminator for viewing industrial X-ray films, providing four times more illumination than heretofore available, is being produced by the *Kelley-Koett Mfg. Co.*, Covington, Ky. A cooling system using a built-in fan to blow air between an inner special heat-resisting glass and an outer flashed opal glass front permits use of Photoflood lamp. An ultra-high intensity spot gives four times the brightness of the large section. The glass front of the spot is water-cooled, with the light from the lamp actually passing through 4 in. of water.

Stove Dome Pyrometer

A FIXTURE adapting its radiation unit to the measurement of blast furnace stove dome temperatures has been designed by the *Bristol Co.*, Waterbury 91. It consists of a gate valve to enable the unit to be removed for service and an air purge to cool the lens and unit. The radiation unit is used in conjunction with the Pyromaster potentiometer pyrometer.

ALUMINUM DIE-PRESSED FORGING by REVERE



Weight: 17 lbs.; diameter: (top) 7 3/4"; diameter: (bottom) 9 5/16"

The cylinder barrel muff which we illustrate is typical of the strong close-grained, die-pressed aluminum forgings in which Revere has pioneered so successfully—especially in the aviation industry.

This particular cylinder barrel muff is used in certain types of radial aircraft engines and with special success in one of the famous engines extensively used by the Navy. When finally machined, the resultant thin fins reach almost to the core of the cylinder itself and provide an unusually large cooling surface.

Revere forgings are also available in copper, various copper-base alloys and magnesium. Almost any shapes and sizes can be had, even those ordinarily pronounced "impractical" or "impossible".

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• Automotive community feels progress was made at Washington meeting, but chafes at continued slowness of preparations . . . Will reconversion decentralize the industry?

DETROIT—Automobile company executives have returned to Detroit in a moderately satisfied frame of mind following their meeting last week with the War Production Board.

The meeting provided opportunity for viewpoint trading which the auto presidents felt was valuable, and which evidently may have modified some thinking in the top command of WPB. The Detroit feeling has been that while its problems have been readily understood by the Automotive Branch of WPB, they have not been so well appreciated by the policy-making offices of Donald M. Nelson and Charles E. Wilson.

As a result, the auto companies feel that they have definitely eliminated the possibility of a single company's being designated to produce a quantity of passenger cars to supply essential needs. In the first place, the industry as a whole would bitterly oppose one firm's getting a wide head start on the others, because of the advantages accruing to the head starter in expansion of distribution and dealerships. In the second place, the industry does not feel that the number of cars still on the road indicates a serious shortage for at least a year, probably more

Although a WPB trial balloon suggesting production of cars by one company seems to have been fairly well deflated by last week's meeting, the industry is still not sure that all its members will get off to an equal start. Some executives believe that prewar competitive positions may well be modified by the exigencies of reconversion, dictated by unemployment developments and facilities availability.

If unemployment plays the major share in determining when and where reconversion shall begin—a well indicated probability—then an even start for all automobile producers might be practically impossible. But this would be compensated for in part by limited allocations, rather than unlimited "goaheads," so that even if a few firms got off behind the parade, they would be sure of finding a market for their goods.

The size of any forthcoming allocations provided some slight bit of fireworks inside the meeting, as it had in individual company thinking in Detroit prior to the assembly.

DISPUTE was touched off when President C. E. Wilson of General Motors suggested a starting point of allocations for 2,000,000 vehicles for the industry—more than half of United States 1941 output of 3,744,300 passenger cars. The inference was for a proportionate reduction for each manufacturer.

The independents, moving as had been expected before the meeting, rose to oppose this viewpoint. The aggregate figure of 2,000,000 was approved, but not the proportionate breakdown. The smaller companies maintained they could not produce profitably at their indicated levels.

This, of course, was to be expected. It is equally to be expected that when the final determinations are made the smaller firms will be treated as they were when cutbacks first began to be ordered on passenger car production during 1941. Initial reductions on a flat percentage basis were quickly modified to give the smaller producers a larger percentage of the base figures.

"Practical minimums" will be reported by each manufacturer at a subsequent meeting to be held early this summer. All effort will be made by the automotive community to hasten this meeting, because it is felt in Detroit that the sooner the tracks are cleared for reconversion—even if the actual event does not come for a long time—the better. Complaint has been common in Detroit, both before and after the meeting, that preparations for reconversion are being moved too slowly.

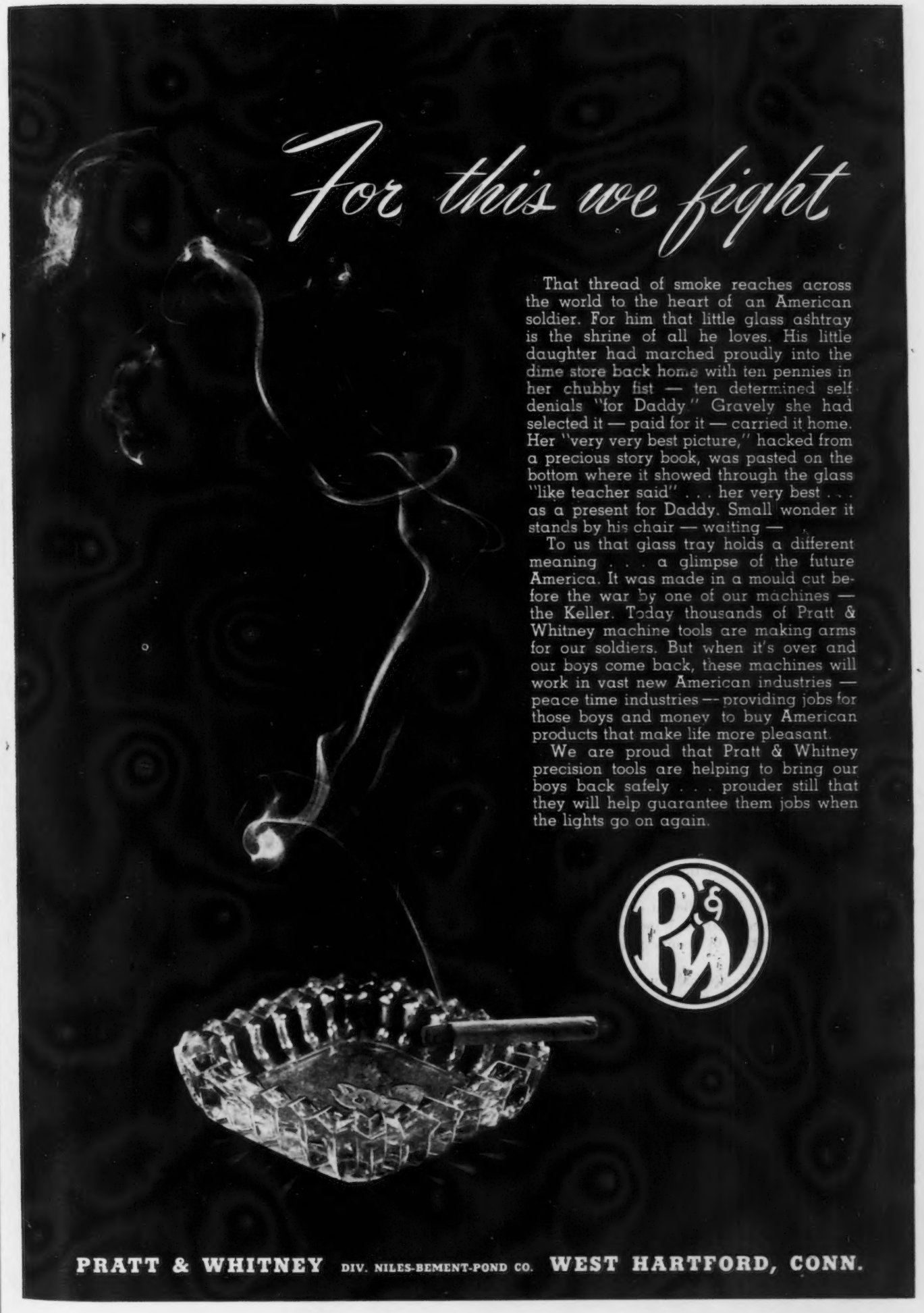
Further delay will largely be determined by the length of time required by WPB to arrange the legalities necessary to authorize reconversion. For instance, the auto people want to order production on machine tools as rapidly as possible, and this was discussed at the meeting. But, it turns out, WPB can permit such manufacture only by abrogation of existing limitation orders. Should these orders be cancelled, the field would be open to all; developing the possibility of an undignified and really large-scale scramble to get on the machine tool company books. What WPB would then need would be authority to parcel out allocations for reconversion requirements, such as it has possessed for war goods machines.

THE indication that reconversion will begin as soon as either the European or Pacific war ends (conceivably sooner, if large scale cutbacks provide notable unemployment in auto centers) raises a question of the highest significance as regards the future of Detroit as an automotive center.

Assume, for instance, that arms commitments in Detroit continue strong while they taper elsewhere. It would be entirely logical to expect passenger car makers still involved in Detroit to arrange for production facilities elsewhere to insure their return to production as rapidly as others in the field. Particularly would this be a likely possibility in view of two additional factors. First, war-scheduled production plants would be cluttered up with government machinery and war goods activity, necessitating large scale reconversion anyway. Second, such a move would carry the manufacturers out of the troublesome Detroit labor market.

It is not too far fetched to believe that the installation of production facilities elsewhere, simply to meet a momentary need, might be the start of a full fledged decentralizing move out of Detroit. Certainly the auto industry is deeply irked with labor's behavior in the automobile city, and might welcome opportunity to get away from it all.

IN any case, one company which probably must make arrangements to produce cars elsewhere is Packard, because that maker's facilities are crammed with aircraft and marine engine contracts which can be ex-


For this we fight
That thread of smoke reaches across the world to the heart of an American soldier. For him that little glass ashtray is the shrine of all he loves. His little daughter had marched proudly into the dime store back home with ten pennies in her chubby fist — ten determined self denials "for Daddy." Gravely she had selected it — paid for it — carried it home. Her "very very best picture," hacked from a precious story book, was pasted on the bottom where it showed through the glass "like teacher said" . . . her very best . . . as a present for Daddy. Small wonder it stands by his chair — waiting —
To us that glass tray holds a different meaning . . . a glimpse of the future America. It was made in a mould cut before the war by one of our machines — the Keller. Today thousands of Pratt & Whitney machine tools are making arms for our soldiers. But when it's over and our boys come back, these machines will work in vast new American industries — peace time industries — providing jobs for those boys and money to buy American products that make life more pleasant.
We are proud that Pratt & Whitney precision tools are helping to bring our boys back safely . . . prouder still that they will help guarantee them jobs when the lights go on again.
PRATT & WHITNEY DIV. NILES-BEMENT-POND CO. WEST HARTFORD, CONN.

pected to continue until the last guns are being fired.

Packard has been pondering this problem for many months and has been an active seeker for spare factory space, presumably for standby purposes. Evidences that this quest has been successful came this week in speeches by president George T. Christopher before eastern dealer groups.

Said Christopher: "If Washington gives the go ahead, Packard can build some cars along with its continued war manufacturing. We can start producing cars about four months after we get the green light, providing materials are made available."

Enlargements and rearrangements of plant facilities at Detroit thus far, said Christopher, indicated a 44 per cent increase in Packard's postwar capacity for making cars. New buildings have been put into operation in Detroit and Toledo, bringing the operation a total of 4,600,000 sq. ft. of productive factory space, exceeding in size the gigantic area of Willow Run.

Buick, meanwhile, has begun new tooling programs on two additional types of P&W engines which will be produced at Flint and Melrose Park. Both are twin row Wasps, the R-1830-75 and R-2000-9, developing greater horsepower than current types. The former of these will supersede the R-1830-43 in B-24 Liberators; the latter will power Douglas transports. Anticipated output of these units helps to increase 1944 schedule projections 22 per cent higher than the volume of 1943.

Ford of Canada Cancels CIO Contract

Windsor, Ont.

• • • **A labor dispute** which might go to a last ditch stage was anticipated here after 14,000 employees of the Ford Motor Co. of Canada, Ltd., walked out on strike last Thursday, and the company in retaliation cancelled its bargaining contract with the CIO-United Automobile Workers.

The strike started when 7500 day workers walked out in protest at methods by which grievances are handled by the company. An hour later Wallace R. Campbell, Canada Ford president, announced the abrogation of the contract, citing a clause which permitted such action in the event of strikes.

A Dominion War Labor Board conciliator came immediately to Windsor and began negotiation to resume production at the plant.

The shutdown called a halt on the manufacture of gun mounts, trucks, and other war products. Shortly afterwards the Gotfriedson Co., Ltd., laid off 500 workers producing parts supplied to Ford, and several other Windsor plants indicated that they would shortly close because of the situation at the Ford outlet for their products.

A detailed company statement accused the shop stewards and plant committeemen of the UAW of violating the procedure for negotiating grievances. It was claimed that the union officials left their regular company duties at will without obtaining permission from their foremen to do so, and remained away for excessive periods to investigate grievances. Evidently as a result of such action, four stewards had been recently discharged, a move which led to the walkout.

In reply, a labor mass meeting pledged to continue the strike until the contract with the union was reinstated, until the four stewards were taken back on the payroll, and until the Dominion War Labor Board had ironed out the basic difficulties.

Norman W. Foy Will Address Steel Warehouse Convention

Cleveland

• • • **Members of the** American Steel Warehouse Association, Inc., attending the 35th annual meeting at the Drake, Chicago, May 9 and 10, will concentrate upon problems directly related to the war program.

The current steel situation will be reviewed by Norman W. Foy, director of WPB's Steel Division. J. R. Stuart, chief of the Warehouse Branch, will outline some of the fundamental objectives of M-21-b-1 and CMP Reg. No. 4 which control the acquisition and resale of steel by warehouse distributors.

Problems of establishing and enforcing maximum ceiling prices on steel obtained from surplus and excess stocks will be discussed by E. L. Wyman, head of the OPA Steel Warehouse and Surplus Materials Branch.

An insight into postwar conditions to be faced by steel distributors will be given by Herman W. Steinkraus, president, Bridgeport Brass Co., and by R. E. Zimmerman, vice president in charge of research, United States Steel Corp.

On May 10, Mr. Stuart and Mr. Wyman will hold a series of ten-minute conferences with individual members of the industry.

Ship Welding to Feature Cleveland A.W.S. Meeting

Cleveland

• • • **Several speakers** of national prominence will address the annual welding conference to be held under the auspices of the Cleveland section of the American Welding Society at the Hotel Statler, May 12. At the afternoon session, A. G. Bissell of the Bureau of Ships, U. S. Navy, will speak on "Common Sense Practice in the Use of Welding in Ship Construction." Other speakers will be W. J. Conley, consulting engineer, Lincoln Electric Co., and Fred L. Plummer, consulting engineer, Hammond Iron Works, the first named covering recent welding techniques and the latter speaking on the welding of pressure vessels.

At the dinner meeting, G. N. Sieger, president of the S.M.S. Corp., Detroit, will preside as toastmaster. David Arnott, national president of the A.W.S. and vice-president of the American Bureau of Shipping, will discuss the growing importance of welding in shipbuilding. William B. Stout, well known aeronautical engineer, will speak on "Research and Postwar."

Appoint Costs Subcommittee For Steel Castings Industry

• • • **Appointment** of comptrollers or auditors of seven steel castings companies to serve as a standing subcommittee on costs of the industry was announced by the OPA recently.

Members include: Harry McClees, Crucible Steel Casting Co., Lansdowne, Pa.; Clarence A. Porter, Sawbrook Steel Castings Co., Lockland, Ohio; George Alston, General Steel Casting Corp., Eddystone, Pa.; J. L. Daugherty, Union Steel Casting Co., Pittsburgh; H. L. Holtz, Sivyer Steel Casting Co., Milwaukee; August C. Christiansen, Pratt & Letchworth Co., Inc., Buffalo; George W. Sanlen, Caldwell Foundry & Machine Co., Birmingham.

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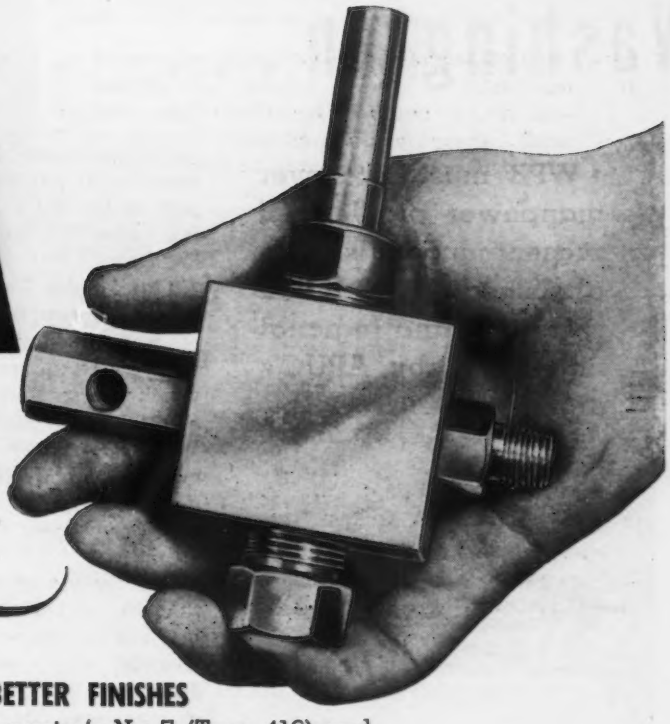

• FASTER MACHINING SPEEDS—BETTER FINISHES

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Rigid control of the uniform, free-machining qualities of this Stainless, lot after lot, make it easier to meet close tolerances and required finishes—thus cutting rejections to a minimum. You can be sure that every bar of Carpenter Free-Machining Stainless will perform as easily as the one before.

• LONGER TOOL LIFE

Longer tool life, fewer regrinds and a marked reduction in tool breakage results when parts are made from this Stainless.

• LOWER UNIT COSTS

All the factors above will make possible lower unit costs in machining parts from Stainless Steel. If you would like help in applying Free-Machining Stainless to your problems, we will be very glad to be of assistance. Call in your nearby Carpenter representative or write us at the mill.

• IF YOU ARE RESPONSIBLE for cutting costs in the machining of Stainless parts, the information in this 98-page book, "Working Data for Carpenter Stainless Steels", will be helpful to you. Drop us a line on your company letterhead indicating your title, and we will put your copy in the mail.

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Washington . . .

L. W. MOFFETT

• WPB must take over manpower problems if present muddle is to be abolished . . . Radio recruiting and regional adjustment by APUC's urged.

WASHINGTON—If the manpower muddle is ever to be cleaned up before the need for a solution is obviated by the end of the war, the War Manpower Commission must be abolished and the control over manpower must be returned to WPB. The reason is that WMC has failed miserably and production demands can no longer lean on the weak reed of WMC's "coerce, fumble and bungle" policies.

There is general agreement that there would be no manpower shortage if industry used labor to greater advantage, if labor indulged in no strikes or slow downs and if labor were properly distributed.

There are three reasons manpower must be straightened out. The needs of war production must be met, the needs of civilians must be satisfied without interfering with war production, and a healthy economy must be maintained.

There are four ways to accomplish these ends. They are: 1—Enactment of some form of National Service legislation; 2—regional adjustment of civilian production by Area Production Urgency Committees according to the relative availability of plant capacity and labor; 3—national scheduling on a basis never before attempted with control over military and civilian production through decisions based on detailed analysis of plant and area shop loading schedules, time interval schedules, and manpower requirements; and 4—intensified radio recruitment on a national and regional basis, devoid of pseudo-patriotic fluff, to borrow a meaningful phrase from a recent report of the WPB Anti-Friction Bearing Labor Advisory Committee.

THE point has passed when material supply is the choke point of war production. But WPB has built itself up merely as an agency which passes out materials. Now war programs such as ball bearings, synthetic rubber and high octane gasoline are feeling the manpower pinch, and WPB finds itself practically powerless to do anything about it.

The feeling is mounting in WPB that its authority is gradually fading out as materials become more plentiful and component bottlenecks disappear. Yet WPB will be blamed if manpower shortages cause great production slumps.

WPB chairman Donald M. Nelson originally had authority over manpower under his executive order, but he consented to the creation of WMC because he felt that the manpower job and the production job were separate and too large for one agency to handle. The time is approaching when that authority must be returned.

The poor distribution of labor like the poor distribution of materials will yield only to a hardboiled policy. The Selective Service System's induction of progressively young, then older men, may have a tendency to take the water out of industrial manpower requirements, but it will not solve the distribution problem.

CIVILIANS do have needs during war that must be met to maintain minimum health and morale standards. War production would quickly go into a tailspin if civilian needs were ignored. Consequently, the collateral demands of civilian production for manpower must be met along with the demands of war production and the problems of reconversion are no less important than the problems of military manufacture.

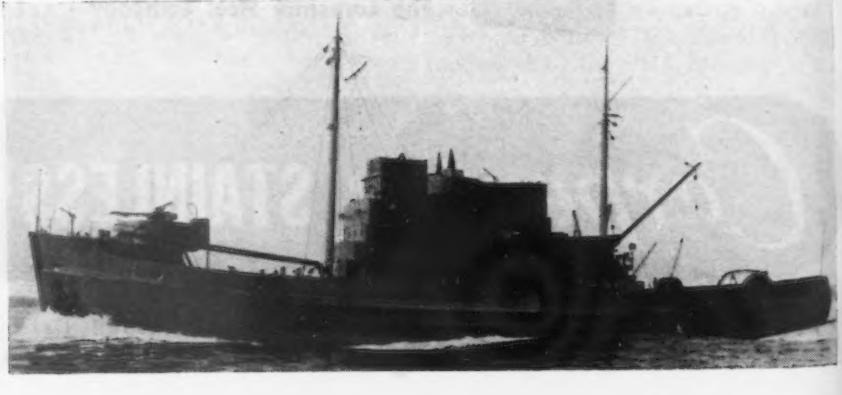
While the armed services do not feel that they have any responsibilities toward the health of the economy, it is well established that the government, when it marshals the entire economy, has a responsibility to prevent a postwar economic crackup by giving the proper accent to civilian production while the war is going on. The War Industries Board of World War I recognized this duty and translated the duty into action.

Mr. Nelson also sees his duty, but now his hands are tied by the War Department's hostile attitude toward the most limited resumption of civilian production. WPB is further hampered by the fact that it has no control over manpower.

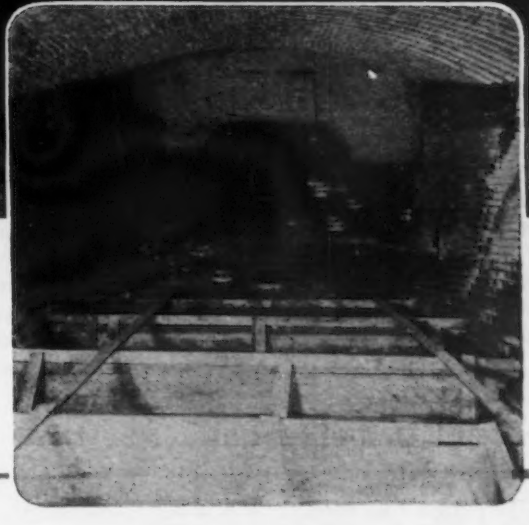
Of the four methods of cleaning up manpower, only two are feasible at this time—regional adjustment by APUC's, and intensified radio recruiting. The reasons of lateness and lack of administrative skill to successfully put over the program applies to the National Service Act and the production scheduling suggestion. It is too late for a National Service Act, as Mr. Nelson has pointed out, and even if that were not true, forced labor has little value and therefore is inefficient and wasteful both of manpower and materials.

National production scheduling, while it might have worked to a lim-

THE AMERICAN RESCUE SHIP *"Lincoln-Salvor" with power supplied by six Cooper-Bessemer Diesel engines, is one of the first to enter service in the huge American-British Salvage Program.*



Below—the completed Ramix hearth. Note the smooth, well-shaped contour of back wall, front wall, port slopes and uptakes. At left—the furnace before Ramix was installed. Right, below—forms in place for ramming in the flat.



RAMIX helps make Steel for Victory

This is one of a battery of eleven new 225-ton open hearth furnaces completed in 1943. All have hearths constructed of Ramix.

Ramix is a unique refractory material that is cold-rammed in place to form the furnace bottom and banks, on which steel is melted and refined. As it is a high-magnesia-type refractory, reinforced with chemical bonds, Ramix is not affected by the high temperatures met in the open hearth furnace, and unlike most magnesia refractories is NON-HYDRATING.

Not only does every Ramix hearth installed save several days of construction—making possible 10 to 15 additional heats of steel in the time saved, Ramix also makes a clean, slag-resistant bottom that requires a minimum of maintenance and repair. Delay time is reduced, furnace output per manhour is increased, steel poured is cleaner, and quality better.

Steel is being made on Ramix bottoms in more than a hundred open hearths today. They represent better than 12% of the basic open hearth steel capacity of America. They range in size from small 20-ton jobs in steel foundries to the largest furnaces yet built. They are located in every important steel producing center.

Experienced Basic Refractories Engineers are at the service of the steel industry to supervise the installation of Ramix bottoms. Let us know when there is a hearth job to be done.

BASIC REFRACTORIES, INCORPORATED *Cleveland 15, Ohio*

ited degree if initiated at the beginning of the war, is far too complicated to justify the need for it now. It would be a CMP for manpower, and would necessitate getting all of the shop capacity lead time and manpower requirements of the nation and combining them into a master schedule on a vertical basis.

THE war is too far advanced and business, already beseiged by a multitude of forms, is too weary and bored with plans and questionnaires to take on a super-dooper new one. It is felt that it would retard production.

On the other hand, the Area Production Urgency Committees, now functioning in tight labor areas, could estimate the needs of civilian and military production and adjust non-military production schedules to area plant capacity and manpower supply.

There are 11 APUC's and 50 modified APUC's set up by War Mobilizer James Byrnes to function under WPB executive vice chairman Charles E. Wilson. These committees now have only the duty of attempting to trouble-shoot the production problems of area war plants. Their authority could be extended to reconversion. Loose labor areas would not require the same attention.

Each committee has representatives of the War and Navy Departments, WMC, WPB and other claimant agencies interested in a particular tight labor area and through familiarity with the area involved is frequently able to bring about production and manpower balance.

The committees now can recommend the tearing out of war contracts or contract discontinuance to adjust contract volume to the facilities and labor in the area. They could just as well adjust the area's civilian activity, and would be fitted to do so because they are on the spot.

The plan has the advantage of being done locally. Most of the planning of civilian production that is going on is happening in Washington without any idea of availability of labor or plant capacity. This is cockeyed, because it does not take manufacturing conditions into consideration. The same criticism can be applied to the so-called "priority lists" based upon assumed consumer demand of permitting industries to reconvert according to a master blueprint in Washington.

The most important thing to decide about reconversion is not "where?", "how much?" or "what?", but "when?" The determination of when a given tight labor area is loose enough to permit added civilian production can only be made on the spot and by individuals who are conversant with local conditions.

SINCE none of the agencies dealing with manpower are willing to do so, WPB should be given authority to institute an effective radio recruitment program. The first thing which the Austin-Wadsworth National Service Bill would require to be done would be to ask for volunteers. Why can't this be done without universal or limited draft act?

Labor is criticized for turnover and war agencies have up to this time acted as though they were powerless to solve local manpower shortages. The perfectly obvious fact is that working men cannot be blamed for not getting into essential production if they don't know where they are needed.

What is primary is an early daily radio program using United States Employment Service information, listing the firms needing employees, what kind of jobs are available, and at what salaries. Firms could agree to pay the cost of telegraphic communication and would only be free to ask for the number of employees required to break the manpower bottlenecks.

But the various labor agencies cannot agree who should do this, and all sorts of excuses are offered for not doing it. The argument is made that state boards of trade and commerce object to regional recruiting because local businessmen like to have a little labor surplus around and that the Pace Act makes it illegal for anyone to recruit men from agriculture areas without the permission of county agents. Strikes and slowdowns would be minimized if workers were constantly informed of manpower demand.

March Alloy Output Totals 952,287 Tons

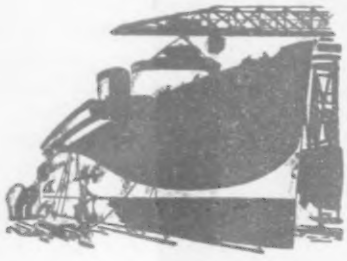
• • • Production of alloy steels during March totaled 952,287 tons, about 12 per cent of total steel production during that month, according to the American Iron and Steel Institute.

In February, 905,131 tons of alloy steel were produced. In March a year ago alloy steel production reached a monthly peak of 1,283,709 tons, or 17 per cent of total steel output. Open hearth furnaces produced 626,607 tons of alloy steel in March, and the remaining 325,680 tons of alloy steel production came from electric furnaces.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

WEST COAST . . . OSGOOD MURDOCK

• Geneva mill producing 10,000 tons of plate this month and 20,000 in May . . . Richmond shipyards might be converted to Pacific Foreign Trade Zone postwar . . . Aircraft plants must now hire four to net gain one.



SAN FRANCISCO—During April 10,000 tons of ship plates are scheduled for delivery to Pacific Coast shipbuilders from the new Geneva plate mill in Utah. For May the production schedule calls for 20,000 tons. From the Kaiser Fontana mill, March plate production was over 31,000 tons. From now on, therefore, a substantial tonnage of plate used by the beaver-busy shipbuilders on the West Coast will be produced west of the Rocky Mountains.

In that first plates were rolled at Geneva on March 23, and that only one blast furnace out of three and only three open hearths out of nine are in operation, April and May initial commercial production of plates at Geneva seems remarkable to realistic operating men. No rolling mill has ever before operated within 500 miles of Geneva and it has been necessary to recruit and train an entirely new mill crew. Operation has so far been confined to one turn per day. Shortage of labor has been particularly difficult in the coal mines in southeastern Utah, limiting the coke supply. Currently some 150 high school boys are being employed on weekends to relieve the situation in the maintenance department and the management states that at least 500 more men could be put to work immediately.

Thomas M. Price, who was in charge of construction of the Kaiser mill at Fontana and was previously an ace construction man for Kaiser in his dam building days, has been named vice-president of Kaiser Co., Inc., in charge of operations of the iron and steel division. Frank Backman is general superintendent at Fontana and Tom Hart, formerly superintendent of the coke and by-products division, becomes assistant general superintendent.

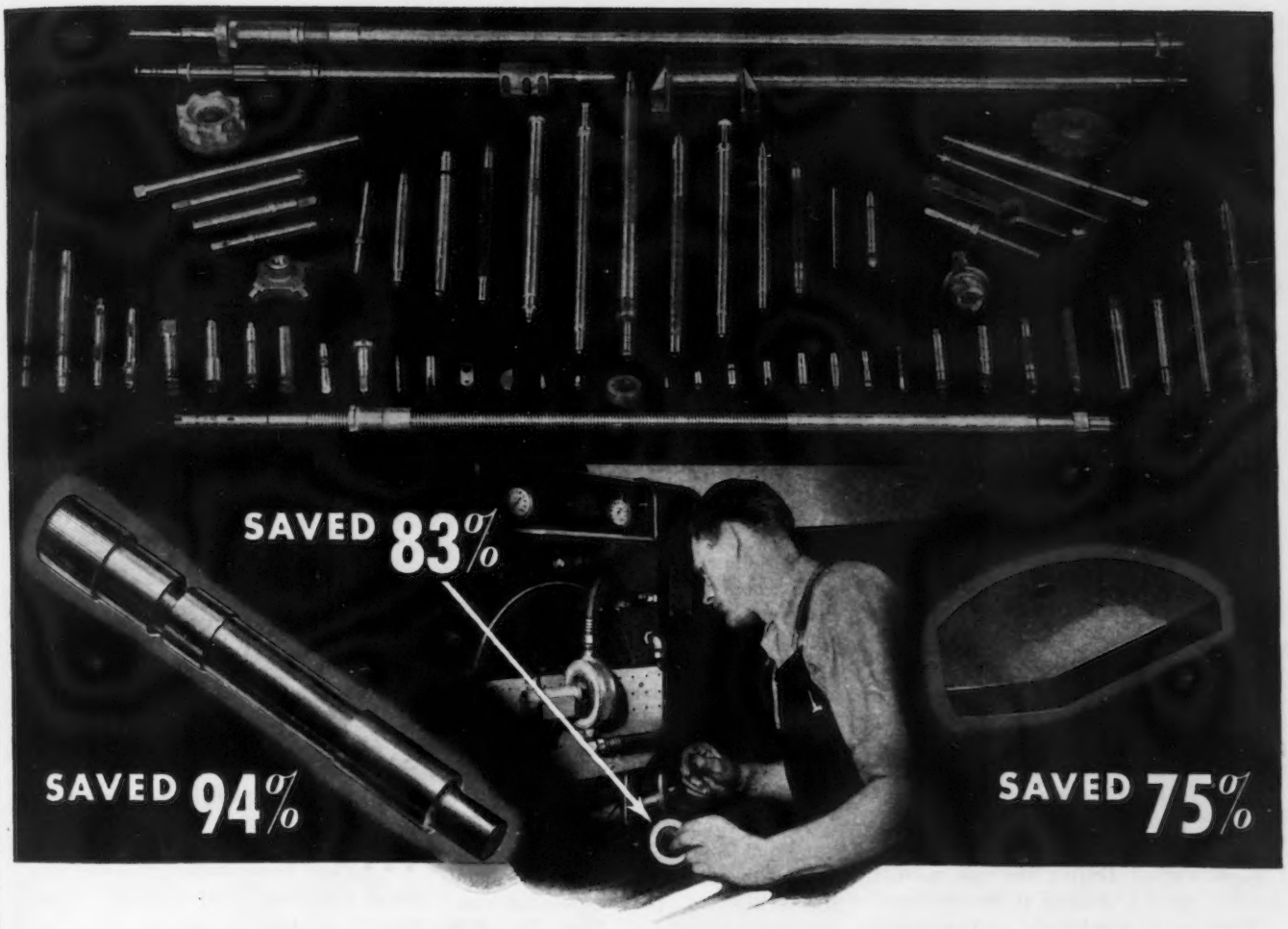
Tom Price and George Havas, chief engineers, have just returned from a plane visit to Venezuela, examining iron deposits and conferring with the management of Fabrica Nacional de Cabillas y Productos Metalurgicos at Caracas. Negotiations and proposals are reported pending whereby one or two open hearth men from Fontana may be sent to Caracas to supply technical information and advice on operation problems on a small open hearth furnace there. How soon new learners teach!

A NEW proposal, and a promising one, seemingly, for ultimate disposition of the big Kaiser Liberty-Victory shipyards at Richmond on San Francisco Bay has been tossed informally and unofficially into the ring, to be badgered and worried by the matadors and picadors of postwar destiny until ripe for the final kill. It is pointed out that the West Coast should have a Foreign Trade Zone, similar to present arrangements on Staten Island in New York Harbor where imported shipments could be warehoused, reconsigned, processed, combined and partly reshipped to other foreign ports free from customs duty and import restrictions. For this purpose Richmond offers promising possibilities. Yard Three with its concrete basins and graving docks is considered a permanent building and repair yard, as well equipped and situated, if not better, than any yard on the West Coast. But yards one, two and four cover extensive areas that will have to be converted to permanent industry postwar or will surely revert to the tidelands, fishing camps, and pleasure yacht and motor boat moorings whence they sprang.

A self-respecting Foreign Trade Zone should have a deep water channel adjoining acreage for manufacturing and fabrication, extensive warehouses and transit sheds, mainland rail connections, truck transit facilities, location near a major trade and commercial city and isolation from its immediate surroundings to facilitate customs guard. All these attributes seem liberally provident in the Richmond location and facilities. It's another way to jump, but it looks like a good one.

PROMINENT on the front page of the current issue of CIO's weekly official California newspaper, the radical, direct action, restless and profit baiting *Labor Herald* beams the beneficent portrait of Preston Hotchkiss, president of the California State Chamber of Commerce, executive vice-president of the Pacific Indemnity Co. at Los Angeles, director of the Consolidated Steel Co., and former president of the Los Angeles Chamber of Commerce. He is commended as a "leading business man of vision," because the Chamber is in "solid agreement with labor" in its declaration in opposition to the right to employment initiative petition now being circulated in California. Immediately following this independent and courageous declaration by the officers of the State Chamber, the board of governors of the San Francisco Employers Council and the directors of the San Francisco Chamber of Commerce declared themselves similarly in opposition on the ground that the issue is controversial and would interfere with the war effort by causing dissension between industry and labor.

Petitions to place this initiative constitutional amendment on the California ballot originate in southern California and are said to be inspired by the Los Angeles Merchants and Manufacturers Association which has been traditionally anti-closed shop. The measure is termed "right to employment" and its proponents state that it is aimed to provide jobs for the returning service men, but labor realizes that in attempting to outlaw closed shop arrangements it would threaten the trade union movement. The text of the proposed amendment to the state labor code provides that any worker having or seeking employment shall not be prejudiced be-



"Hot-Bed" of THRIFT

at Kearney & Trecker

SINCE a year before Pearl Harbor, a speedy TOCCO Induction Heat Treating Machine has teamed up with progressive engineers of Kearney & Trecker Corporation, Milwaukee, Wisconsin to produce saving after saving . . . improvement after improvement . . . for part after part of the quality line of Milwaukee Machine Tools.

Now, 138 different parts are TOCCO-hardened by Kearney & Trecker. These range in size from 1-oz. pins to 90-lb. table screws. Material includes carburized low-carbon steels, medium carbon and plain carbon steels and alloy steels.

Production increases of 100% to 500% and cost reductions as high as 94% are obtained . . . and these benefits are being sought continually for more and more of their heat-treated parts.

Typical output for an 8-hr. shift is 1600 pieces —10 different parts (5 different fixture set-ups).

Find out how TOCCO can speed *your* production and cut *your* costs. New booklet, "Results with TOCCO", free on request.

THE OHIO CRANKSHAFT COMPANY • Cleveland 1, Ohio

TOCCO

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ANNEALING..HEATING

★

cause he or she does or does not belong to a labor organization. Under the proposed statute, preservation of union membership and even the collective bargaining provisions of the Wagner act might be challenged within the state. Enlightened, open minded, and liberal leaders in the field of management and industrial relations genuinely hope that this voluntary, forthright and courageous opposition by organized commercial leaders may advance labor management relations and mutual confidence between employers and employees, each organized for enlightened collective relationship with each other.

WHEN long faced, soft boiled wordy manpower officials gravely pronounced that 20,000 more women will be needed in southern California aircraft plants by July, perhaps they actually hope to get 5000 workers. No one seems to know very positively what any manpower officials have in mind, but the actual experience of major aircraft companies indicates that it is necessary nowadays to hire at least four people to get one additional worker. During the nine months ended April 1, Boeing at Seattle hired 34,486 new employees and actually net gained 8192 workers. To get this many workers, Boeing had to offer employment to eight out of every nine applicants, because practically everyone willing to work should be able to do something in an operation as big and varied as aircraft building with a personnel running well into five digits. Of the employees representing net gain for the period, 4000 were recruited from outside the state of Washington by the company's recruiting crews which, incidentally, were often handicapped and impeded by the complicated, involved and jurisdictionally jealous WMC and U.S. E.S. regulations with reference to releases, referrals, clearances and classification. In addition to the 8192 workers gained net on the company's payroll, Boeing added more than 1000 others by letting work out to subcontractors.

A LONG standing civil suit filed by the Attorney General of the United States against a number of Puget Sound maritime shipyards alleging improper charges to the government on cost plus contracts has been settled out of court for a net joint compromise contribution of $10,200 from Associated Shipyards, Lake Washington Dry Docks, Puget Sound Bridge & Dredging Co., Inc., and several individuals. Although yard officials still deny the charges, they found that the cost of the litigation and the time involved would be more than the settlement and that it was cheaper and more effective to call it quits and let work proceed. The compromise figure covers the government's actual claims, but without penalties or punitive payments.

Steel Products Warehouse Assoc. Announces New Officers

• • • **Following the** quarterly meeting of the board of trustees of the Steel Products Warehouse Association, Inc., held in Pittsburgh, W. E. Thoresen, president and chairman of the board, announced the advancement of J. E. Lavine, Union Steel Co., Warren, Ohio, to first vice-president; J. B. Ribakoff, Reliance Steel Corp., Cleveland, is now trustee-at-large and member of the executive committee; Harry Resnick, Universal Steel Co., Cleveland, treasurer; Joseph Gendelman, National Sheet Steel Co., Detroit, second vice-president; Donald C. Lott, Tin Mill Products Co., Pittsburgh, secretary, and Clayton Grandy, executive secretary.

Rolling Mill Machinery Advisory Committee Formed

Washington

• • • **Eight representatives** of manufacturers of rolling mill machinery and equipment were recently appointed as an industry advisory committee to OPA to meet soon and advise on pricing problems arising within the industry.

Committee members are: G. N. Herman, vice-president, Continental Roll & Steel Foundry Co., East Chicago, Ind.; Q. S. Snyder, president, Pittsburgh Rolls Division of Blaw-Knox Co., Pittsburgh; J. R. Patterson, vice-president, Mackintosh Hemphill Co., Pittsburgh; J. L. Campbell, sales manager, Ohio Steel Foundry Co., Lima, Ohio; B. G. Parker, president and general manager, Youngstown Foundry & Machine Co., Youngstown, Ohio; L. W. Nash, manager, E. W. Bliss Co., Salem, Ohio; R. A. Cannon, vice-president, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., and G. R. Casey, president, Treadwell Engineer-

Secondary Mills to Be Featured at AISE Meeting

Pittsburgh

• • • **The Association of Iron and Steel** Engineers will hold its annual Spring meeting at the William Penn Hotel, Pittsburgh, on May 8. The meeting will be held under the auspices of the Rolling Mill Committee, and Louis Moses, Bethlehem Steel Co., Sparrows Point, Md., chairman of the committee, has announced a program dealing primarily with secondary mills. The one-day program is scheduled for morning and afternoon, ending with a dinner at 6:30 p.m.

The program includes the following papers:

"Operating the Continuous Furnace by Automatic Temperature Control," by B. M. Putich, combustion engineer, A. M. Byers Co., Ambridge, Pa.

"Heating and Rolling in Bar Mills," by J. L. McHugh, general foreman No. 18 Mill, Jones & Laughlin Steel Corp., Pittsburgh.

"Main Roll Drives for Merchant, Bar and Rod Mills," by W. B. Snyder, steel mill engineer, General Electric Co., Schenectady.

"The 26-in. and 22-in. Mills at Atlas Steels, Ltd," by C. P. Hammond, superintendent of mills, and A. M. Cameron, roll designer, Atlas Steels, Ltd., Welland, Ontario.

"Steel Roll Manufacture and Application," by Dr. F. H. Allison, chief metallurgist, United Engineering & Foundry Co., Pittsburgh.

. . . Cited for Awards . . .

• • • **The following** companies have won the Army-Navy E award for outstanding war production:

American Car & Foundry Co., Chicago Plant, Chicago, Ill.
American Stove Co., Quick Meal Division, St. Louis, Mo.
Applied Optical Industries, Hamburg, N. Y.
Argo Lamp Co., Philadelphia, Pa.
Clark Grave Vault Co., Columbus, Ohio.
Defender Photo Supply Co., Inc., Rochester, N. Y.
Douglas Aircraft Co., Inc., Santa Monica Plant, Santa Monica, Cal.
Elgin Machine Works, Elgin, Ill.
Flury & Crouch, Inc., West Palm Beach, Fla.
The General Industries Co., Elyria, Ohio.
I. X. L. Machine Products, Inc., Jacksonville, Fla.
Louis Marx & Co., McMechen, W. Va.
Mataplast Corp., New York.
Serrick Corp., Acme Lees Division, Muncie, Ind.
W. A. Sheaffer Pen Co., Fort Madison, Iowa.
The Thomson Co., Inc., Millen, Ga.

. . . PERSONALS . . .

LESLIE L. FREY, vice-president in charge of sales, General Tool & Die Co.

• **Leslie L. Frey** has been elected vice-president in charge of sales, General Tool & Die Co., East Orange, N. J. Mr. Frey comes from the Sperry Gyroscope Co., where he was director of labor relations and assistant to the general plant manager.

• **J. A. Drain, Jr.**, has been elected vice-president in charge of product engineering, research and development, and **O. J. Neslage**, vice-president in charge of sales in the United States and Mexico, Sullivan Machinery Co., Michigan City, Ind.

• **Charles L. Turner** has recently been made vice-president in charge of sales of the Buffalo Bolt Co., North Tonawanda, N. Y. He has been controller of the company since 1939.

• **Walter H. Ferguson** has been elected vice-president and director of sales of the National Mfg. Co., Tonawanda, N. Y.

• **Arthur F. Skaife** has been named to the newly created post of Pacific Coast district manager for the Westinghouse Electric Elevator Co., Jersey City, N. J., and **Gano R. Baker** has been named Southern California manager for the company at San Francisco.

• **W. W. Scull** has been appointed manager of the synthetic rubber plant at Port Neches, Tex., of the B. F. Goodrich Co., Akron, Ohio. Mr. Scull joined B. F. Goodrich in 1929, and has been operations manager of the Port Neches plant since last July. He succeeds W. J. Piggott, who has resigned. **John D. Beebe** has been named manager of a new department, rubber suspension sales.

• **Albert P. Leonard** has been made manager of the New York office of the Farrel-Birmingham Co., Inc., Ansonia, Conn., and Buffalo.

• **C. R. W. Thomas** has joined the technical staff of sales and service engineers of the Standard Varnish Works, New York. He will be in charge of activities in the Baltimore territory.

• **L. A. Selleg** has been appointed manager of the Westinghouse Electric & Mfg. Co.'s petroleum, chemical and mining section, Northwestern district, with headquarters in Chicago.

• **Vern G. Zeller**, director of the Wisconsin state department of securities, has joined Ray-O-Vac Co., Madison, Wis., in an executive capacity.

• **John Avery** has been appointed manager of the blower and compressor department, Allis-Chalmers Mfg. Co., Milwaukee, succeeding **G. L. Kollberg**, who has retired after 47 years with the company. Mr. Avery became associated with Allis-Chalmers when that company assumed the American interests of Brown-Boveri in 1931. He has been assistant manager of the blower and compressor department since 1935. Prior to his association with the American Brown-Boveri Co., he had been with the General Electric Co. and with Brown-Boveri in Switzerland.

• **James H. Marks** has been named executive vice-president of the Packard Motor Car Co., Detroit. He joined Packard in 1916 as plant engineer, and has been successively twin-six production manager, industrial engineer and purchasing manager. In 1940 he was made a vice-president.

• **James F. Reid**, former deputy chief of the Alloy Steel Branch of the WPB, has been appointed production manager of The Timken Roller Bearing Co., Canton, Ohio. He had been production manager of the steel and tube division of the company before obtaining a leave of absence in May, 1942, to join WPB. Mr. Reid first joined Timken 25 years ago.

• **W. G. Hassel** has been appointed manager of sales, Pittsburgh Crucible division of the Crucible Steel Co. of America with offices in Pittsburgh. **W. W. Noble** has succeeded Mr. Hassel as manager of Crucible's Detroit branch and **John S. Billingsley** has returned to Pittsburgh to assume the managership of the Pittsburgh branch.

• **Ralph R. Browning, Paul P. Huffard** and **Homer A. Holt** have been elected directors of the Union Carbide and Carbon Corp., New York. Mr. Browning and Mr. Huffard have been vice-presidents of the corporation since 1939. Mr. Holt is a Charleston, W. Va., attorney and is the former Governor of the State.

• **Joseph F. Gaffney** has been appointed district manager in Rochester, N. Y., of the H. K. Porter Co., Inc., Pittsburgh. **R. W. Steves** and **W. T. Campbell** have been made managers of the district offices in Cincinnati and Philadelphia, respectively.

• **H. A. S. Howarth** has recently joined the Production Engineering Co., Berkeley, Calif. He was the founder of the Howarth Pivoted Bearing Co., Philadelphia, which he operated for a number of years.

• **Frank M. Blum** has been appointed manager of the crane sales division, Harnischfeger Corp., Milwaukee, succeeding Benjamin Van Horn, retired. Mr. Blum who joined the company in 1929 has been assistant manager of the crane sales division since 1938.

FRANK M. BLUM, manager, crane sales division, Harnischfeger Corp.

• **Lauson Stone**, president, has been elected chairman of the board of Follansbee Steel Corp., Pittsburgh. **John Follansbee**, former chairman of the board, will continue as a member of the board of directors. Mr. Follansbee has been associated with this and predecessor companies for approximately 50 years.

• **A. C. Kingston** has been appointed consultant to the president on matters of sales policy of the Boston Woven Hose & Rubber Co.. **H. F. Maxon** has been appointed general sales manager of the company; **W. I. Lewis** has become assistant general sales manager, and **W. F. Carroll** succeeds Mr. Maxon as district sales manager of New York and Pennsylvania.

• **Bernard J. Conway** has been made a member of the engineering and service staff of the Udylite Corp., Detroit. He will be in charge of the southeastern Pennsylvania and southern New Jersey territory with his headquarters in Philadelphia.

• **Quincy M. Crater** has been appointed assistant manager of the Westinghouse Electric & Mfg. Co.'s Detroit office. **Frank H. Butt** becomes supervisor of the switchgear and control order service, with headquarters in East Pittsburgh.

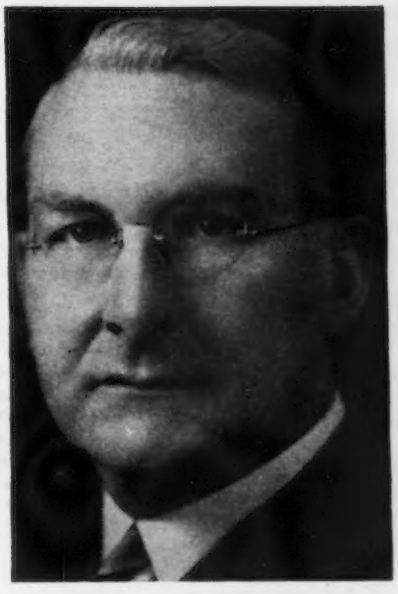
• **Delmar M. DeWolf** has been made advertising manager of Skilsaw, Inc., Chicago.

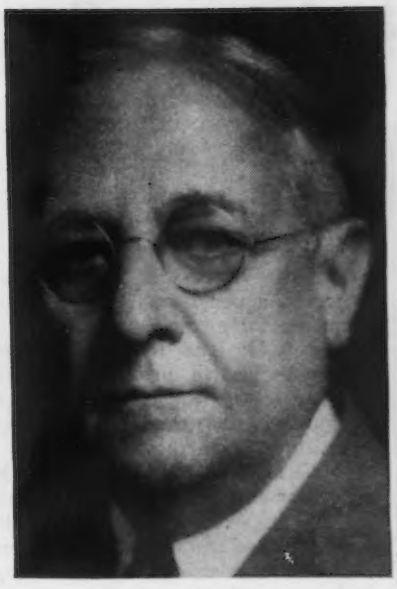
Edward L. Steinle has severed his connection as sales manager, vice-president and director, New Britain Gridley division, New Britain Machine Co., New Britain, Conn.

• **Homer A. Garland** has been named to take charge of a new Spokane, Wash., sales office of Link-Belt Co., Pacific Division. He has been associated with Link-Belt since 1922, when he was employed by the company's Seattle warehouse. Later he became connected with the Pacific Northwest sales organization, first making his headquarters in Seattle, and since February, 1940, in Spokane.

• **William Davey**, former general manager of Curtiss-Wright Corp. Buffalo plants, has joined Bell Aircraft Corp. as assistant works manager of the Niagara Frontier division factories.

• **H. C. Hopkins** has been appointed general manager of purchases of American Can Co., New York, and **Jesse H. Hamilton** has been made assistant manager of sales, Pacific division with headquarters in San Francisco.





LAUSON STONE, president and chairman of the board, and JOHN FOLLANSBEE, retiring chairman, Follansbee Steel Corp.

• **R. A. McCarty**, who has been in charge of subcontracting activities for Westinghouse Electric & Mfg. Co., has been granted a leave of absence to assume a position in Washington with the Smaller War Plants Corp.

• **Col. Harry Scullin**, president of Scullin Steel Co., St. Louis, for the past 46 years, has been elected chairman of the board. He is succeeded as president by **E. F. Judge**, former vice-president and treasurer. **W. H. Chickey**, former secretary, becomes vice-president and comptroller and **William J. Monahan**, former assistant secretary and assistant treasurer, now is secretary and treasurer. **Edwin L. Kaiser** succeeds him as assistant secretary and assistant treasurer.

• **G. Clymer Brooke**, formerly assistant secretary of the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has been elected assistant to the president, while **Lester E. Leinbach** has been elected assistant secretary. **B. M. Staley** has been made works manager.

• **Wallace Johnson** has recently been appointed general sales manager of the Joshua Hendy Iron Works, Sunnyvale, Cal. Mr. Johnson was previously with the Autometric Machine Tool Co., where he served as sales manager and chief engineer, and later assumed the general management of Production Engineering Co. of Berkeley, Cal.

. . . OBITUARY . . .

• **Byron Henry**, general superintendent, Wheeling Mold & Foundry plant, Continental Foundry & Machine Co., died suddenly in Wheeling, April 13th.

• **Harold L. Smith**, chief electrical engineer for the Louis Allis Co., Milwaukee, died April 11. He was 53 years old.

• **John Schmidt**, 71 years old, superintendent of the Burlington Brass Co., Burlington, Wis., died April 11.

• **Joseph P. Kennedy**, president of Kennedy Foundry Co., the Baltimore Malleable Iron & Steel Casting Co., and William C. Robinson & Co., died April 17 at the age of 55.

• **Michael M. Klosson**, 51, chief engineer of Buffalo Pumps, Inc., died suddenly April 11. He was also a director of the company, and an authority on pumps for naval vessels.

• **Jules Endweiss**, controller for many years for Kennecott Copper Corp., died April 19 after a protracted illness. He was 61 years old.

• **John N. McElravey**, superintendent of open hearth furnaces of the Carnegie-Illinois Steel Corp., died recently at the age of 47.

Fatigue Cracks . . .

BY A. H. DIX

Interest In Reverse Gear

• • • Back in the Middle Ages the charging of interest was considered a device of the devil and an economic boll weevil besides, for anyone with a long piece of paper, a pencil and patience could prove that even the smallest loan at compound interest would result ultimately in the lender's descendants owning all the world's wealth, provided nothing interfered. But something always did interfere; so the Jeremiahs were confounded, and the charging and payment of interest attained respectability.

We heard a talk the other night by Robert R. Nathan, former chairman of the WPB planning committee, that made us wonder if interest will again be looked upon as a locked up stress in the economic weld. His theory is that depressions are caused by over-saving, and that the way to prevent depressions is to balance income and outgo.

As the theory is not new and has been dissected time and again by economic anatomists, we will not insert our awkward scalpel. We would, however, like to dwell on an inevitable result of putting the theory into practice. As the saver would become a sinner, a means of discouraging his vice would have to be found. Instead of being rewarded, through interest payments, for unspent income, it would be necessary to require him to pay for the privilege of not spending all he made. Bond coupons would become dues. Interest procedure would be reversed. A charge would be made against bank deposits as in the story of the colored banker who was called upon to return a small sum deposited years ago. "That's all gone," he said. "The interest done et it all up." The villainous borrower would threaten the lender's daughter with a fate worse than death if the lender did not succeed in paying by Saturday midnight the reverse interest charge called for in the mortgage.

We have wandered down only a few of the trails the theory opens up and we find the scenery exciting, but have not yet been able to tell how much of it is real, and how much mirage.

Call For Beefsteak

• • • As proof that the Army is not entirely content with a mental fare of "Superman" and "Li'l Abner," we quote this "Letter to the Editor," clipped from a Denver newspaper:

> "I wonder if you can help me? A cousin who is hospitalized in England writes to ask if I can send him some copies of the Iron Age magazine. I haven't been able to find any in Denver, and I thought some of your readers might have old copies they no longer want. I would be so happy to go and get them."

We have written for the soldier's address and will send copies from here, but if you are in the vicinity of a U.S.O. or camp library, you could do a good deed by making your discarded copies available to soldiers and sailors, each of whom has his own postwar problem. From what we hear, technical journals are being read to tatters.

"Meadows, Our Short Sword"

> . . . See "Fatigue Cracks" of Apr. 13, item headed "Excuse for Hari Kiri." The originator of this should commit hara-kiri . . .
>
> —*R. M. Neff,*
> *Commonwealth Industries, Inc., Detroit*

> No excuse for this, especially in view of the fact that hara-kiri is going to be more and more popular.
>
> —*H. Schlyen,*
> *Falstrom Co., Passaic, N. J.*

We were thinking of the ex-movie actor.

Naval Check

• • • One of our postwar product suggestions has laid an egg. After paying $1.50 for a sealed beam headlamp replacement we expressed the hope that someone would re-invent the old style 25c bulb, which results in this:

> Before entering the Navy I had something to do with the adoption of the sealed beam headlamp in one make of car. Among its advantages are (1) lower original cost in the car, hence a corresponding benefit somewhere else; (2) vastly improved lighting; (3) longer life, so that cost per hour is less; (4) ability to give adequate light reflection regardless of age . . .
>
> I hope you will agree that these advantages represent progress, not retrogression.
>
> —*P. S. de Beaumont, Lieut., U.S.N.R.*
> *Washington 8, D. C.*

This shows the need for continued advertising. We had forgotten, if we ever knew, the points in favor of sealed beam headlights, and are glad to know that the additional $1.25 was well invested. We are also glad to have this confirmation of our conviction that the odds against making a sensible comment on a topic concerning which the commentator is poorly informed are stupendous.

Stopper

• • • How to hide death . . . with chicken feathers! — *DeVilbiss Co.*

Black Eye For Testimonials

• • • Few who have passed adolescence are shocked at the Federal Trade Commission's disclosure that you do not have to smoke a certain brand of cigarette to be eligible to receive a check for a testimonial. In fact, you need not even be a smoker.

No illusions have been destroyed, for the creators of cigarette advertising have never made a fetish of credibility. The only damage done is that a fresh black eye has been hung on the testimonial's battered face. This comes at a bad time for us, as we were all set to release a flock of testimonials of our own.

We are placed, to coin an expression, in the horns of a dilemma. Shall we wait until Time's finger applies the healing beefsteak or shall we expose our bouquets before they wilt? We will compromise by selecting a few specimens of Pacific Coast blooms:

> Your West Coast Industrial Summary ("West Coast," page 76) is a splendid and commendable job of industrial reporting.
>
> —*From one of California's major aircraft plants*

> I find The Iron Age most necessary, and need it by my chair when I come home from the day's work.
>
> —*From a Seattle manufacturing executive*

> The Iron Age is a No. 1 favorite of mine.
>
> —*From a California aircraft plant executive*

> I get my money's worth from the editorials alone—the rest is velvet.
>
> —*From a California manufacturing executive*

Ignoring your yawns, we would like to add that these are not only unpaid for, but were also unasked for, and even unhinted for.

Puzzles

• • • Answer to last week's book-buying problem is that Peter is Dick's father.

You got to bed early last night if you can solve this in three minutes:

A takes one-third of a pile of apples; B takes one-third of the remainder; C takes one-third of that remainder. Then they divide equally what is left. No apples are left over; no apple is cut. How many does each get?

Our puzzle book gives only one set of answers. If there are several right answers, give the smallest.

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There Can Be No Compromise!

There can be no compromise in any industry where fast, accurate, reliable weighing is a factor.

The decision of the scales must be final and absolute . . . with no tolerance for concessions or adjustments due to weighing inaccuracies.

Fairbanks-Morse Scales more than meet that demand. They are accurate. They are reliable. They have been since 1830—when the first Fairbanks-Morse Scale was built.

Today, Fairbanks-Morse Scales are found in every type of industry. They are used not merely as scales, but as highly efficient production tools that speed operations and eliminate costly errors.

Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

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PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Scales

Dear Editor:

SURPLUS SALES SNAG

Sir:

On page 91 of your Mar. 30 issue is an article on disposal of surplus of U. S. Government equipment and supplies. We bought supplies and equipment after the first World War and have bought some from this war.

The biggest trouble we have had both at the present time and in times gone by is the lack of responsibility on part of the U. S. Government in looking after the purchasers' interest in regard to packing and shipping. As this is of great importance to the buyer, I would like to offer a suggestion that an extra charge be made, perhaps 10 per cent or less depending on type of equipment purchased, for the packing and shipping to be f.o.b. transportation company's dock.

The various places you listed cover a large part of the country and heretofore the packing and shipping of these goods has been left up to various outside organizations who charge as much or more than the goods are worth to have them shipped.

The people disposing of these government supplies are not business people and are not particularly interested in whether they are sold or not. Sometimes the longer the sale lasts the longer their job lasts. Under these conditions the sale of goods is limited to just a few buyers who are not always of the highest type and as a result the Government receives little or nothing for the goods on account of the conditions that exist.

JOHN J. NORMOYLE
John J. Normoyle Co.,
607 Third Ave.,
Moline, Ill.

LOST WAX PROCESS

Sir:

Will you kindly let me know in what issue you published an article describing the manufacture of supercharger parts for General Electric Co. by the "lost wax" process?

DONALD R. STEELE,
Metallurgist
Progressive Foundry Works, Inc.,
10 Mount Read Blvd.,
Rochester, N. Y.

● See Feb. 10 issue, page 52, for the article, "Precision Casting of Turbosupercharger Buckets."—Ed.

CHIP DISPOSAL

Sir:

The March issue of "Mechanical Engineering" contains an article "Chip-Disposal Methods" based on a paper that your Technical Editor, Frank J. Oliver, gave at the last ASME annual meeting. It tells about a European method for compressing aluminum borings or chips and extruding them after having recompressed them at a temperature between 500 and 850 degrees F.

We would be interested in having you refer us to any literature that may exist on this subject.

H. S. LEADER,
Research Department
American Seating Co.,
Ninth and Broadway,
Grand Rapids 2, Mich.

● See the article in the Aug. 12, 1943, issue, beginning on page 90, entitled, "Mechanical Ingoting of Aluminum and Magnesium Turnings," by Max Stern, of Loma Machine Mfg. Co., Inc.—Ed.

FORGING BOOKS

Sir:

What book do you recommend on forgings made by steam hammer or hydraulic process?

EMIL REINHART
EFG Engineering Works, Inc.,
305-11 So. Victoria Ave.,
Pueblo, Colo.

● The "Forging Handbook" published by the American Society for Metals, 7016 Euclid Ave., Cleveland.—Ed.

X-RAY MINIATURES

Sir:

To whom should we write to get further information on "X-Ray Negatives Made on Miniature Film," page 49 of your Mar. 2 issue?

A. B. REEVE,
Chief Inspector
Nash-Kelvinator Corp.,
14250 Plymouth Road,
Detroit 32

● Write to Hendley Blackmon, Director of Publicity, Westinghouse Electric & Manufacturing Co., Park Bldg., Pittsburgh.—Ed.

OIL DRUM GADGET

Sir:

Some time ago we read somewhere about a company that makes a gadget to cut the ends out of oil drums. What is the company's name.

I. B. COHEN
Glazer Iron and Metal Co.,
520-610 Chamberlain St.,
Knoxville, Tenn.

● Merrill Bros., 5 Caspian St., Maspeth, N. Y.—Ed.

NE STEELS

Sir:

I am a time study engineer and would appreciate any information you can give me on NE Steels as to machinability, Brinell, general breakdown, etc. I am having trouble getting required production out of some jobs in my department and would like to get data that will help me in solving some of my problems.

M.R.L.
Dayton, Ohio

● We recommend The Iron Age's NE Steel—Standard Steel Chart, published as a supplement to the May 6, 1943, issue. Price 25c in stamps. Also see the many articles on NE Steels in The Iron Age and its contemporaries. Excellent booklets on NE Steels have been published by many of the steel companies.—Ed.

GRAPH-MO

Sir:

The article entitled "Tool Steel Coding" in the Mar. 30 issue does not do justice to Graph-Mo. Undoubtedly the authors had no intention of discriminating against any steel but were merely presenting their system of handling tool steels so that others could benefit by it. It would appear to me that the system described has considerable merit and that many plants would benefit by adopting it.

In Fig. 1, entitled "draw temperatures of Convair tool steels for maximum hardness and toughness" dissimilar data are presented as similar and used for comparative purposes. To be specific, the data for the graphs marked Circle No. 3, Diamond No. 1, Square No. 1 and Ellipse No. 1 were undoubtedly based on Carpenter's torsional impact tests. These graphs compare exactly to those published by Carpenter for Number 11 Special, Stentor, Solar and Hampden respectively. According to Carpenter's manual the figures were obtained by machining a test piece ¼ in. diameter by 1 in. long, heat treating it, and then breaking it with a tortional impact blow produced by a flywheel. The force required to break the piece is measured in foot-pounds, and is plotted on the ordinates of the graphs. The figures for Circle X or Graph-Mo on the other hand, were undoubtedly obtained from the Timken Graphitic Steel booklet (page 9 of the 8th edition). These impact figures for Graph-Mo were obtained by machining a piece to 0.394 in. square, heat treating it, placing it in an Izod testing machine and measuring the impact in foot-pounds necessary to break it.

From the graphs in question, it would appear that in the usual working hardnesses Graph-Mo is less tough than any of the other steels listed. Actually quite the contrary is the truth. In many applications Graph-Mo has proved to be considerably tougher than the other types of steels indicated. If the graphs were all based on comparable data obtained from similar tests this fact would be evident.

In Table 1 it would seem to me that Graph-Mo should be placed in Group 2 or, even better, placed in a group by itself, because of its suitability for an exceptionally wide list of applications. This versatility of Graph-Mo is due largely to its combination of high wearability and toughness. Properties that are directly refuted by Fig. 1.

In Table III Graph-Mo is omitted from some ideal applications for it. Again I believe this is because of misconceptions arrived at from Fig. 1.

F. D. ILLINGWORTH
A. Milne & Co.,
741 Washington St.,
New York 14

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LARGE SIZE springs can now be supplied at a speed that will "perk up" your production schedules. Extensive manufacturing facilities at Muehlhausen are responsible, where one entire plant is devoted to hot-coiled springs.

Besides quick, quantity delivery, you get two other important advantages from this hot-coil specialization: Design of your springs by Muehlhausen engineers to best meet operating conditions; extra spring life gained by "production lab" control of all processes.

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This Industrial Week . . .

- **Steel Ingot Production Schedules Set to Hit a New Peak**
- **Heavy Demand for Shell Steel Predominates Lively Market**
- **Industry Starts Presenting Case before Wage Panel of WLB**

STEEL ingot production schedules spurted this week to an alltime tonnage peak as pressure from war agencies mounted. National operations are estimated at 99 per cent of capacity, a gain of two points from last week.

Large new inquiries for shell steel and added demand for quick delivery of lend-lease semifinished steel have tightened mill schedules during the past few days. It is reported that several producers have queried WPB on how to rearrange schedules already booked at 110 per cent of capacity for the next six months ot take care of impending shell directives.

The rapidly mounting demand for shell steel is expected to reach a crescendo in October when requirements will be about double those of March. Because the impact of this program is heaviest in the larger size billets, certain mills equipped to make these large sizes will share in the program to a much greater extent than others. The shell program is so heavy in nature and involves so much slow cooled material that it may well affect the production of rail and structural steels in coming months. Three sizes of shells have been given particularly high urgency ratings—155 mm., 8 in. and 240 mm.

Meanwhile, the steel industry began presentation of its case before the steel wage panel of the National War Labor Board in Washington with vigorous statements by B. F. Fairless and Lauson Stone. On the other hand, John A. Stephens, chairman of the Steel Case Research Committee, urged that companies and the union enter into more amicable relations. In the "zeal of fury" of the union's presentation, many things which should have been left unsaid were said, and a period of mutual respect was in order, with the union observing proprieties and moderation in dealing with the steel companies.

At the same time is was reported in Washington that if WLB grants the steel workers more than 7c. per hr. wage increase, the steel industry will be entitled to an across-the-board raise for all steel products under OPA regulations.

This OPA policy was announced by Deputy Price Administrator James F. Brownlee before the House Banking and Currency Committee. He said OPA grants general price increases whenever the profits of an industry sink below the level of the base period. Annual profits in the base period, taking into account the fact that OPA is getting financial data from 26 companies which represent 80 per cent of the industry, were $116,900,000. An 8c. per hr. wage increase would cost the industry about $108,563,000, including overtime for wage earners and salaried workers.

OPA agreed, as previously reported, that the prices of rails, structurals, bars, strip, and sheet be increased. Announcement, however, has been delayed. In line with the OPA policy of compensatory adjustment, it is said that maximum analysis extras for NE steels of 8600-8700 series will be decreased along with prices for rolled armor plate, propeller blade steel and for bullet core steel.

On the manpower front it is expected that Selective Service soon will announce that the manpower supply is sufficient to enable industry to retain essential men over 30 and most essential men between 26 and 30.

A wildcat strike of 45 workers in the Hazelwood byproduct coke plant of the Jones & Laughlin Steel Corp., early this week, forced several thousand other men out of work, closed three blast furnaces, closed the company's wide strip mill working on war plates, closed a large bar mill, and, at Tuesday noon, threatened to shut operations at the blooming mill.

MARKING the first rise in a year, machine tool shipments in March were valued at $50,799.000, an increase of nearly 1.5 per cent over the $50,098.000 total in February, according to a preliminary report issued by the WPB Tools Division. Shipments in March of last year were valued at $125,445,000 compared with $114,594,000 in February, 1943.

The total of orders received in March of this year was valued at $41,854,000, an increase of 19.6 per cent over the February total of $34,995,000. February orders received were 12.7 per cent over January. The backlog of unfilled orders at the end of March was valued at $153,079,000, a decrease of 6.9 per cent from the end of February.

Meanwhile, lathe builders in the Cincinnati area last week reported the receipt of a sudden group of government orders as a result of changes in war plans. The result is that several firms there are fully booked for the remainder of this year. In Washington recently at a machine tool industry

News Highlights in This Issue

advisory meeting it was decided that more drastic steps are needed to find and utilize idle machine tools.

The WPB Steel Division has decided not to allocate alloy steel for lend-lease in the next quarter. Instead, the Treasury Procurement Division has been authorized to purchase lend-lease steel upon a bid basis with the award of contract going to the lowest bidder.

A new inquiry is reported at Cleveland for welded wire aircraft landing mat for delivery between May and September, requiring 108 million ft. of No. 5 hard drawn wire for a total of more than 61,000 tons. Also, there are several inquiries for hot rolled sheet for landing mats with some small producers inquiring for as much as 10,000 tons.

MARITIME Commission plate requirements have been substantially reduced for June and July. This, for the most part, will be put into increased sheet production starting in June, but not all of the reduction in plates will be used to make sheets.

Canadian war industries are planning to resume shell production on a large scale, according to word from government sources. For several months past production of practically all types of shells and explosives has been gradually tapering off in the Dominion. According to Ottawa advices, large contracts will be let immediately for artillery shells. Two weeks ago the United States placed shell orders with a Fort William, Ont., company.

Through war and peace, depression and boom times. consumer cooperatives selling steel products have been handling a rising volume of orders, according to a survey by THE IRON AGE. This year cooperatives expect to sell more than 100,000 tons of finished steel in the United States. The organizations are not idle on postwar planning and their plans include new uses of steel on farms for barns and other structures.

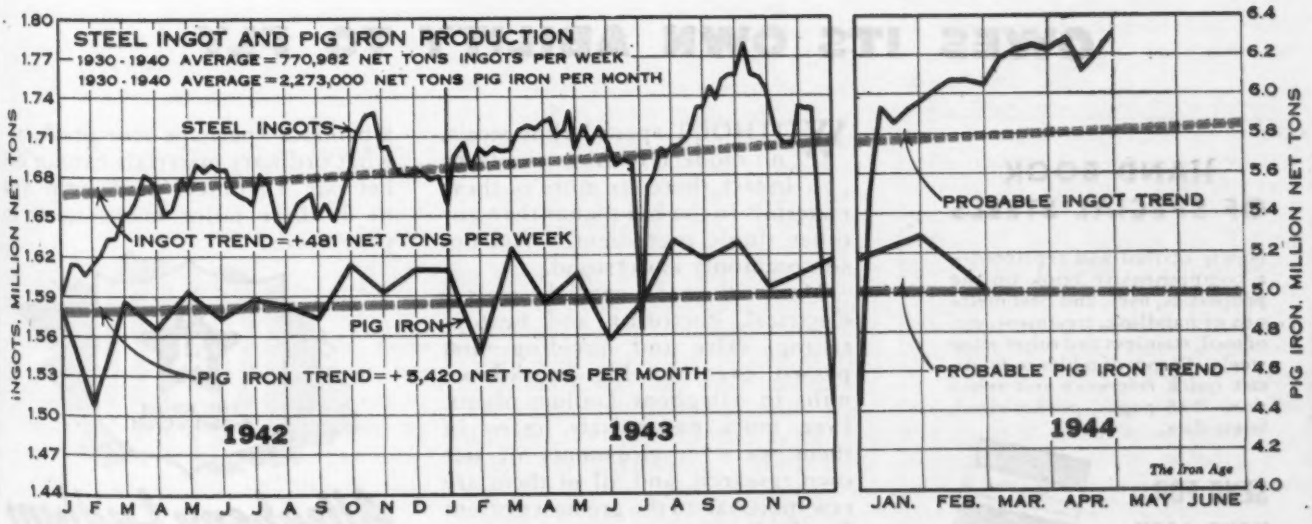
The order which restricted civilian production in 183 production areas, Staff Memorandum No. 42, issued by L. R. Boulware, WPB director of Industry Operations, was withdrawn on Monday. There was much complaint that the order was inflexible, arbitrary and capable of defeating any plan for full utilization of the nation's productive facilities. The action may result in increased production of flat irons, auto parts and other items.

RECONVERSION plans of General Motors Corp. have been laid before the House Postwar Committee in Washington and among other things provide for prompt ordering of materials for 1,000,000 cars, trucks and other GM products at the war's end. Initial peacetime production will consist of 1942 models.

In announcing the first quarter earnings of $17,027,616 before taxes, a rise of $1,621,019 from the first quarter of 1943, U. S. Steel Corp.'s chairman Irving S. Olds said Tuesday that the 17c. per hr. wage demand of the steel union would cost the five steel making subsidiaries $81,300,000 per year; the severance pay demand would cost $10,500,000 per year; and the guaranteed annual wage demand would cost $225,000,000 per year. The Corp., during the first quarter lost 209,000 tons of steel due to strikes, equal to two-thirds of the tonnage lost in all of 1943.

Contributing to this week's rise in steel ingot operations are gains of one point at Pittsburgh at 96.5 per cent; one and a half points at Chicago to 103 per cent; and 11 points at Cleveland to 94 per cent. Other district output increases include the West, up 23 points to 113; Cincinnati, up three points to 96; and the East, up 15½ to 102.5 per cent. Production declines are limited to Youngstown, down one point to 97 per cent; Philadelphia, down one and a half to 91.5; and Detroit, down three to 100.5 per cent.

The Iron Age



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
April 20	95.5	101.5	98.0	93.0	94.0	104.5	96.5	99.0	103.5	90.0	93.0	99.0	87.0	97.0
April 27	96.5	103.0	97.0	91.5	105.0	104.5	96.5	99.0	100.5	113.0	96.0	99.0	102.5	99.0

OWI Photo by Palmer in an Allegheny Ludlum plant

To this Flywheel, Many a Bomber

OWES ITS OWN ABILITY TO FLY

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Newly revised and reprinted—a comprehensive book on the properties, uses, and best methods of handling, treatment, etc. of tool, stainless and other alloy steels. Plenty of tables to facilitate quick reference and selection. 136 pages, pocket-sized, latest data.

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NEWS OF INDUSTRY

Fairless Keynotes WLB Steel Wage Hearings

• • • **Keynoting** the steel industry's case before the steel panel of the War Labor Board, Benjamin F. Fairless, president of U. S. Steel Corp., on April 25, refuted the union's claim that there is wage discrimination against steel workers with the claim that steel workers are receiving the "highest wages they ever received, and this is so whether considered on an hourly, daily, or weekly basis."

Average weekly wages in January, 1944, of steel workers were $52.49, or $7.34 per week more than the average weekly earnings of workers in all manufacturing industries during the same period and $1.28 per week more than the average weekly earnings of workers in durable goods industries. Furthermore, the weekly earnings of $52.49 for steel workers in January, 1944, represented an increase of 56.2 per cent over the average weekly earnings during January, 1941, Mr. Fairless pointed out.

Steel Wage Boost Over 7c May Mean Price Rise. See Page 96.

Mr. Fairless challenged the statement of the union that wage demands can be met without any increase in steel prices. He showed that the total business of 31 steel producers in 1943 totaled $6,294,000,000 with operations close to capacity. However, only $171,000,000, or about 2.75 per cent of sales remained as net income. It is estimated that the allowance of all union demands would impose increased costs on these 31 companies of at least $500,000,000, and the grant of a 17c. per hr. wage increase alone would increase costs more than $200,000,000. Even after taking into account the reduced taxes that would result from increased wages, Mr. Fairless said, "the actual additional cost would be staggering." Also, costs of materials and services purchased by the industry would advance as a direct result of any increase in steel workers' wages.

Charges of hidden profits were denied, and as to tax refunds, Mr. Fairless said such accusations would be answered later in the proceedings. As to the propriety of amounts charged by steel companies for depletion, depreciation, amortization, and reserves to meet war costs, he said such charges are determined by experts on the basis of past experience, and, on the whole, past charges of this character have usually proved inadequate in the long run.

BOEING WIND TUNNEL: *This 16 bladed fan at Edmund T. Allen Memorial Aeronautical Laboratories of Boeing, Seattle, can develop wind velocities approaching the speed of sound.*

Lauson Stone, president of Follansbee Steel Corp., also addressed the panel with regard to the pending wage case. His comments were directly related to his company and its activities. Mr. Stone stated that in October and November, 1943, the two months preceding the CIO-USWA demands, Follansbee sustained a loss of $179,696.20, averaging about $90,000 per month. If Follansbee and its subsidiary should be required to increase wage rates by 17c. per hr., $800,000 per year or about $70,000 per month would be added to costs and further losses sustained.

Regarding the union's memorandum, "Save Small Steel," issued in March by Philip Murray, Mr. Stone said the publication was a scandalous piece of union propaganda designed to serve the union's purpose in the steel wage case. Charges that steel workers are subsidizing these 20 small steel producers to the extent of $4,348,000 a year were labeled by Mr. Stone as "an inexcusable misstatement of fact, at least as far as Follansbee is concerned." He pointed out that average hourly earnings in January, 1944, were $1.05 rather than 90c. claimed by Mr. Murray at Follansbee.

Wage differentials were acknowledged by Mr. Stone, but he pointed out that they were nothing new and such traditional differentials have been approved by WLB.

Labeling the union's original 22 point program as "anti-stabilization," T. F. Patton, general counsel of the Republic Steel Corp., in a brief straightening out the inaccuracies of the union presentation, stated that it is clear that Philip Murray in the early part of last year at the end of the union's National Wage and Policy Conference, had reached the conclusion that the time was ripe for another assault upon the national stabilization policy.

John A. Stephens, chairman of the Steel Case Research Committee, urged that the companies and the unions enter into more amicable relations. He said that in the "zeal of the fury" of the union's presentation, many things which should have been left unsaid were said.

Mr. Stephens called for a period of mutual respect and suggested that the union observe proprieties and moderation in its dealings with the companies.

John C. Gall, counsel for Youngstown Sheet & Tube Co., undertook to explain the companies proposal for procedure to be followed in the case. Mr. Gall said that each issue would be presented by different attorneys associated with the companies, that the general presentations, while not being offered by the industry as a whole, would represent the cooperative effort of all attorneys.

Though the general presentations may not be adopted by all companies, though they may feel free to adopt them, any additional matter pertaining to individual companies will have to be presented at the conclusion of general briefs, Mr. Gall said.

Shell Steel Production Set to Rise; Three Sizes Given Top Urgency Rating

By D. C. MacDONALD
Cleveland Regional Editor

• • • **Steelmakers** will not be surprised to learn that the reason shell steel has been tightening for the past few weeks is due to a new heavy caliber ammunition program and big gun program, both rating top urgency treatment, which are getting underway. Shell steel makers are already reporting a greatly tightened situation and the immediate outlook is not too favorable due to the relatively limited capacity for the large rounds and round cornered square billets being required.

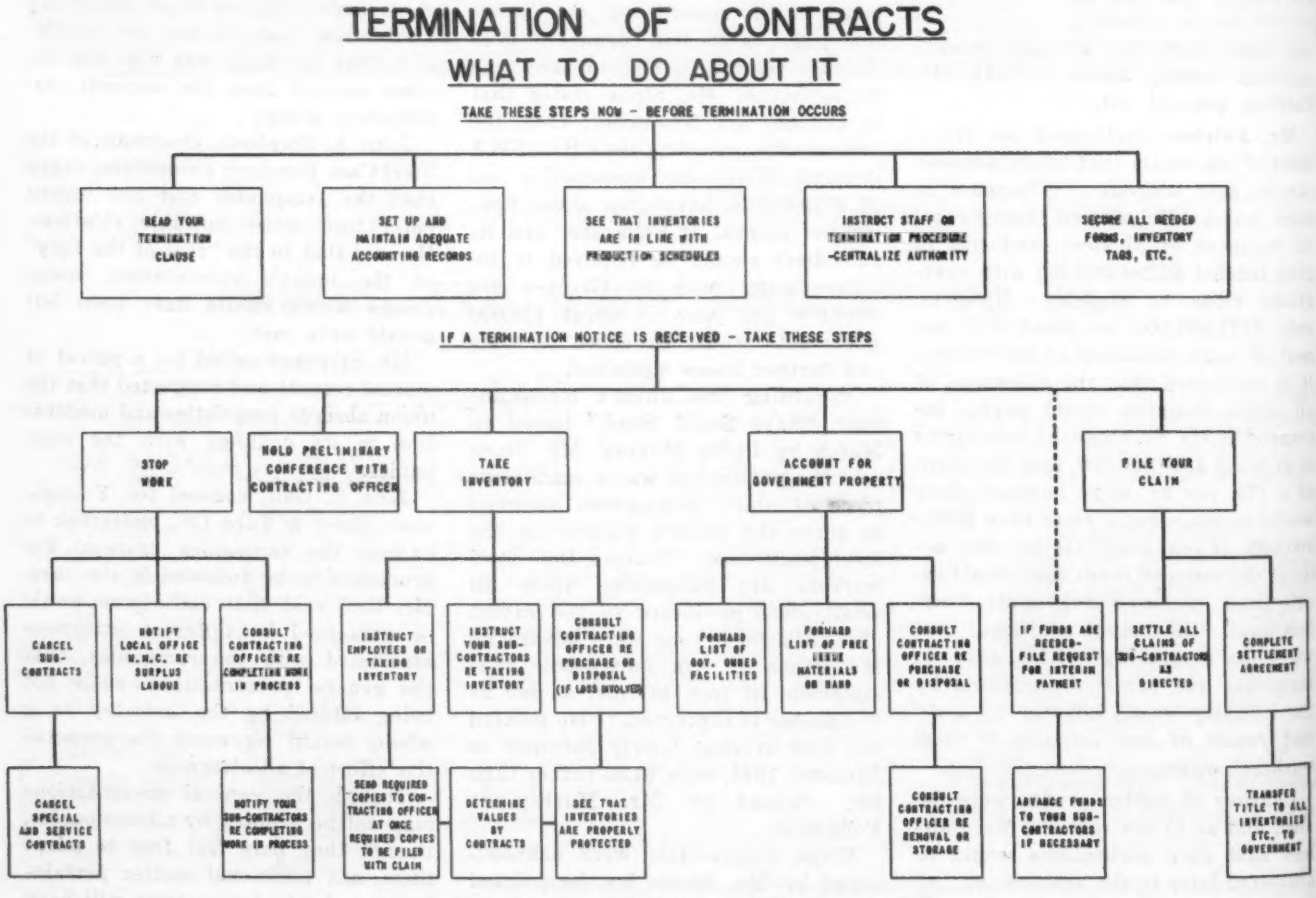
While not too many statistics can be revealed, it can be safely said that the monthly production of heavy caliber shells in this area ranging from 105 mm. to 8 in. will shortly be increased. The newly proved 240 mm. shell is also on the list for drastically increased production. Steel mills will be asked to increase shell steel production by nearly a third and furnish no less than 55,000 tons per month to this area alone.

The big gun program, while an integral part of the material rush, will not enter this district except for components. The Chicago district, it was authoritatively learned, will also come into the program mainly through the field of gun components, but not gun tubes, and will produce only one size of heavy artillery ammunition.

While the extra shell steel tonnage looms large as a problem to steel makers, the real problem will be to locate sufficient rolling capacity to produce the large rounds and round cornered squares required by the shell forgers. The WD-SS3 steel which is required means extra heats of this special grade but the semi-finishing capacity required will tend to limit the rolling of other semi-finished steel needed for the hard pressed finishing mills delivering on other programs.

It is understood that while the ammunition program involves sizes from 105 mm. upward, the top expediting rating of "Emergency Urgent" is being applied only to the 155 mm., 8 in. and 240 mm. shells. This rating applies urgencies on the level of landing craft and related programs which have recently received so much attention. As such, nothing will be permitted to stand in the way of the steel delivery or shell fabrication within the time limit allotted. The schedule, however, has not been revealed other than on a monthly basis except that it is known that some of the new shell fabricating facilities planned as a part of the program will not be finished for several months.

While present shell facilities are expected to be stepped up to the new schedule immediately, a brief moment of respite may be granted the steel mills due to the necessity for building additional shell lines. This planning has already been accomplished and several new 155 mm. and 8 in. shell lines are scheduled for completion within four to six months in this area at a total cost probably exceeding $12,000,000. No new facilities are being



Source: Readjustment Division, A.S.F., March, 1944.

planned for the 105 mm., although this production, too, is being stepped up.

Weirton Steel Co. recently announced its plan to enter shell production and is reliably reported to be planning an expenditure of about $4,000,000 to install facilities to produce the finished 8 in. shell. Most of the new shell installations seem to be of the machine shop nature, which leaves some room for doubt as to where the forging capacity will be found. One mid-western forger, capable of producing forgings for any shell in the range, is reported not engaging in the program due to other contracts.

There is also expected to be some increase again in the shell case program to handle the expanded production. This, however, will only be affected by the increase in the 105 mm., as the larger shells use powder bag charges without fixed or semi-fixed cases. The cases for the 105 mm. will be brass rather than steel.

Mobility and Firepower Sought

Cleveland

• • • **A new and** greatly enlarged heavy artillery shell and big gun program with a top urgency rating that dwarfs the importance of other Army Ordnance programs has started a minor wave of public criticism to the effect that an oversight must have delayed the production of this equipment or that heavy bombers are not performing as expected and that concentration on big guns so late in the invasion preparations may be a rush to cover incompetence in planning. This is tommyrot, according to artillery specialists recently interviewed by THE IRON AGE.

By way of explanation, these authorities outlined the need for artillery under specific circumstances and the reasons for current concentration on sizes from 105 mm. through the heavy 240 mm. sizes.

The reason for using artillery has little to do with the performance of aircraft bombing, this spokesman stated. Artillery is primarily a siege weapon with the ability to accurately and constantly pound a given objective until it is pulverized. Despite the recent high accuracy of precision bombing, the accuracy of bombers has not duplicated that of artillery, due to the many variable factors confronting bombing missions . . . none of which affect artillery, solidly emplaced.

Discussing the aircraft and artillery problems separately artillery men say the heavy gun is chosen in the interest of complete accuracy in wiping out selected and perhaps small objectives confronting infantry troops.

Aerial bombing, it was stated, has its devastating purpose but also its limitations as compared with the uses which most highly recommend artillery. Weather and visibility hamper bombing accuracy very greatly. Accuracy, despite precision bomb sights and automatically controlled bombing runs, cannot match the split hair accuracy and pattern of a solidly emplaced field piece. Twenty-four hour barrages are difficult to maintain by any number of planes no matter how well supplied.

Questions as to why the present emphasis is on the particular gun sizes are answered by one word—mobility. First the caliber must be 105 mm. or larger to give the desired firepower; in other words, larger than the special purpose anti-tank guns, etc., below 105 mm. Secondly, since the war will be one of rapid moves, mobility is a top requisite. The brief descriptive table in first column of the guns being concentrated upon now will prove self-explanatory.

Heavy Artillery Gun Specifications
(Approximate)

Caliber and Type	Weight (Tons)	Maximum Range (Yards)	Fire per min.	Mount
105 mm. Howitzer	2	12,000	4	Mobile
155 mm. Howitzer	5	15,000	3	Mobile
155 mm. Gun (Rifle)	15	25,000	3	Mobile
8-in. Gun (Rifle)	23	35,000	1	Mobile
8-in. Howitzer	15	18,000	½	Mobile
240 mm. Howitzer	25	over 20,000	1	Mobile

Note—These guns have been selected for high fire-power and mobility. The Army also uses 10, 12, 14 and 16-in. guns, but these are either fixed mounts or not mobile in all types of terrain.

M-126 Amended to Aline Controls With Other Orders

Washington

• • • **Minor amendments** of order M-126, designed to bring its controls over the use of iron and steel in a certain number of articles into line with the controls exercised by various limitation orders, were announced last week by WPB. Affected by the action is the manufacture of fountain pens, helmets, awning frames and supports, swivel chairs, wheelbarrows, beds, bedpans, buckets and pails, drawer pulls, furniture, furniture hardware, wire racks, etc.

SCRAP PILE CHAPEAUX: *Girl workers at the Oregon Shipbuilding Corp. staged a fashion parade of spring hats made from materials found in the scrap metal pile.*

Cooperatives, 100 Years Old, Expect to Sell 100,000 Tons of Steel in Current Year

By CHARLES POST
Chicago Editor

o o o

• • • **Just 100** years after the consumer cooperative movement was vitalized in a British milltown grocery shop, cooperatives in the United States expect to sell more than 100,000 tons of finished steel in 1944.

A far cry from Rochdale's initial piddling stock of flour, butter, sugar, and oatmeal, peddled in penny lots to Toad Lane weavers, steel contracts with the principal American groups now cover tens of thousands of tons, and 90 per cent of retailers' orders are in carload lots or larger.

Steel products sold by the cooperatives reflect the needs of the midwestern farm belt where the movement has its roots—woven fence, plain and barbed wire, nails, bale ties, galvanized roofing and siding, and fence posts. Stunted by hostile pressure by private trade outlets, whose displeasure mills hesitated to incur, the co-ops made only slow progress in the sale of steel in the period immediately following first dealings in the material by a Superior, Wis., wholesale group in the mid-twenties. Gradually, however, the opposition was overcome, and in the past decade the cooperative volume has grown like Jack's beanstalk.

Improved relations with competitors and suppliers are attributed by the cooperatives to the public's gradual realization that they are not a price cutting force, but instead are willing to contribute to fair price maintenance. Benefits to customers, which stem from mass purchasing power of the wholesale groups, come in the form of cash or stock dividends, distributed at the end of the year in proportion to the customer's total purchases—the original Rochdale principle.

Most mill and manufacturer dealings are with two national groups, United Cooperative, Inc., with temporary offices at Alliance, O., which specializes in "hard" farm lines and has its greatest influence east of Chicago, and National Cooperatives, Inc., Chicago, which also caters to the towns and claims wholesale outlets "from coast-to-coast and border-to-border." The Southeast has not proved fertile soil for the movement, however.

On the next lower organization level are the wholesale cooperatives, which may be members of either or both National and United, but which are free to make their own deals if they wish. Members of the wholesalers, in turn, are the retail cooperatives; their members are final customers qualified by purchase of a certain amount of merchandise during the year. The price maintenance, profit sharing principle is the same right down the line. National has 11 wholesale members, which together have about 1500 retail outlets, handling steel. United has eight members.

United and National differ somewhat in their relationships with suppliers in that the former actually purchases for its members while National merely negotiates a master agreement under which its members may purchase.

National's mill negotiations are the province of a steel committee composed of the steel buyer of each wholesale member dealing in that commodity. This committee serves as a coordinating agent of the wholesalers, who make known their requirements for the following year each fall. Formal bids are not taken, but suppliers are notified when their prices are not competitive, giving them a chance to make adjustments. Mills with whom agreements are concluded get their orders Oct. 1 and are permitted to make deliveries at their convenience before the following April.

To enable flexibility in sources of supply, steel is sold under the brand name of "Unico" by United, "Co-op" by National. Current suppliers for United are understood to include Republic Steel Corp., Jones & Laughlin Steel Corp., and Apollo Steel Co.; for National, American Steel & Wire Co., Northwestern Steel & Wire Co., Pittsburgh Steel Co., and Cincinnati Sheet Metal & Roofing Co.

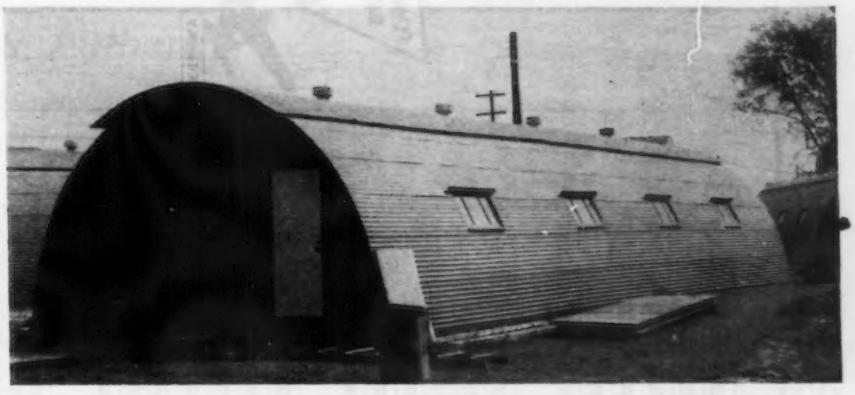
United had its top sales year in 1941, when it handled 1531 carloads of steel products, marking a growth from 300 carloads in 1936, its first full year in the steel business. Wartime restriction and supply difficulties shaved this peak considerably in 1942 and 1943, but 1944 sales are conservatively estimated at more than 1000 carloads. National, whose steel sales have been growing by leaps and bounds, since its first master steel contract in 1940 hopes to hit a $3,500,000 steel volume this year, which can be roughly translated into 50,000 tons of steel products.

One of the principal wholesale cooperatives handling steel—and something of a bellwether for the other groups—is the Indiana Farm Bureau, Indianapolis. Steel purchases have at various times been made through National and United, both of which Indiana is a member, and on certain

POSTWAR PLANNING: *Indiana Farm Bureau's soy bean oil extraction plant at Danville, Ind., is an adaptation of Quonset hut design and specifications. The bureau hopes that prefabrication facilities developed for turning out huts for the Navy can be converted to barn and farm building production along the same line.*

products, independently. E. J. Fricke, head of Indiana's building materials department, is chairman of National's steel committee, an honor which quite possibly is attributable to the fact that Indiana expects in 1944 to account for $1,500,000 of National's $3,500,000 steel sales, and has sold a proportionate amount in previous years. Indiana's 1941 volume in round figures was $800,000; in 1942, $450,000; and in 1943, $1,000,000. The product sales breakdown of a recent 1944 month was 77 carloads of fence, three carloads of nails, two carloads of bale ties, 15 carloads of steel fence posts, and two carloads of sheets. The war's phenomenon has been the huge demand for steel fence posts. In prewar years, sales were never more than 10 carloads; at one recent date, the Indiana Bureau had 70 carloads—560,000 posts—on order. Another specialty which has come into its own is the so-called 1 in. x 2 in. "muskrat fence," which formerly had a limited market in levee construction, but for which the Bureau now has promoted a substantial sale for cribbing, netting under chicken houses, and lawn fence.

The co-ops are not idle on postwar planning. United is leaning toward the addition to its steel lines of pipe for dairy barns and overhead sprinkler systems for truck gardens. National is working on a five-year plan to modernize the homestead. Potentially the most significant development, however, is the possible adaptation by the Stran-Steel division of Great Lakes Steel Corp. of the Navy's arch-roofed prefabricated Quonset hut design to farm structures. Fricke, who is enthusiastic over the idea, does not feel that many of these huts erected overseas will be brought back to this country, or, if they are brought back, sold by the government to civilians. However, he points out that dies, equipment, and facilities for mass production will be available. The huts are built in sections of 40-ft. span and can be erected in any multiple of 20 ft. in length. If a higher structure is desired, a rectangular ground story can be erected with galvanized siding and, in effect, the arched Quonset structure set on top of it. Stran-Steel, a principal fabricator of Quonset huts, has erected a doubledecked barn of this type at Mansfield, O. Indiana Farm Bureau has on order 10 neo-Quonset barns, which it plans to erect in various sections of the state to acquaint farmers with their possibilities. Illustrating the versatility of the structures, one of them—without the rectangular ground story—has been erected by the Bureau as a 40 ft. x 60 ft. soy bean oil plant at Danville, Ind., and another as a warehouse at Connersville, Ind. With suitable partitions, and in appropriate sections, they may be adapted to tool and implement sheds, garages, and other types of farm structures. Costwise the huts, less insulation, are regarded as eventually being a standoff with wood construction and as involving less depreciation and requiring less upkeep.



MARKET POSSIBILITIES: *Thousands of Quonset huts have been prefabricated for the Navy. This one is partitioned into two bedroom apartments.*

In the manufacturing field, cooperatives represent a much smaller steel outlet than as distributors, but recent acquisitions may increase this volume considerably. National Cooperatives in February, 1943, purchased Universal Milking Machine Co., Waukesha, Wis., which had been a national factor in the dairy equipment field. National Farm Machinery Co-op, Shelbyville, Ind., a manufacturing cooperative counting among its 13 members many of the wholesale distributing groups mentioned, manufactures a tractor which in the past has not been produced in large numbers. This machine, incidentally, played a starring role with Eleanor Roosevelt in the plans for the ill-fated subsistence homestead project at Arthurdale, W. Va., and the plant was even moved there for a time. The Farm Machinery organization recently has bought the Corn Belt Manufacturing Co., whose Waterloo, Iowa, plant has been moved to Shelbyville, where this season 1000 corn pickers are being manufactured. The Corn Belt line also includes manure spreaders, tank heaters, and pump jacks. Another acquisition is Ohio Cultivator Co., an old established implement maker, whose plant will stay at Bellevue, Ohio.

AISI Will Hear Tower and Wolman; Banquet is Omitted

• • • **Program of the** 53rd general meeting of American Iron and Steel Institute, to be held in New York on May 25, will feature addresses by Walter S. Tower, president of the institute, Leo Wolman, professor of economics, Columbia University, and several brief talks by representative executives in the industry.

These addresses and talks will be delivered at the morning session of the meeting, which will be held at the Waldorf-Astoria. In the afternoon, technical papers will be presented and discussed. Attendance at all sessions is restricted, as usual, to individual members of the institute. The customary banquet and evening session will be omitted from the program because of the war.

Program of the technical session includes the following papers:

"Development of Special Steels for Ordnance Purposes," by Col. John H. Frye, Office of the Chief of Ordnance, War Department.

"Development of Special Steels for Naval Uses," by Lieut. Comdr. R. A. O'Brien, Research and Standards Branch, Bureau of Ships, Navy Department.

"Stresses in Welded Structures," by H. C. Boardman, director of research, Chicago Bridge & Iron Co.

"The Weldability of Steel," by Prof. Wendell F. Hess, Rensselaer Polytechnic Institute.

"Problems Involved in Determining Hardenability Limits for Alloy Steels," by L. L. Ferrall, chief metallurgist, Rotary Electric Steel Co.

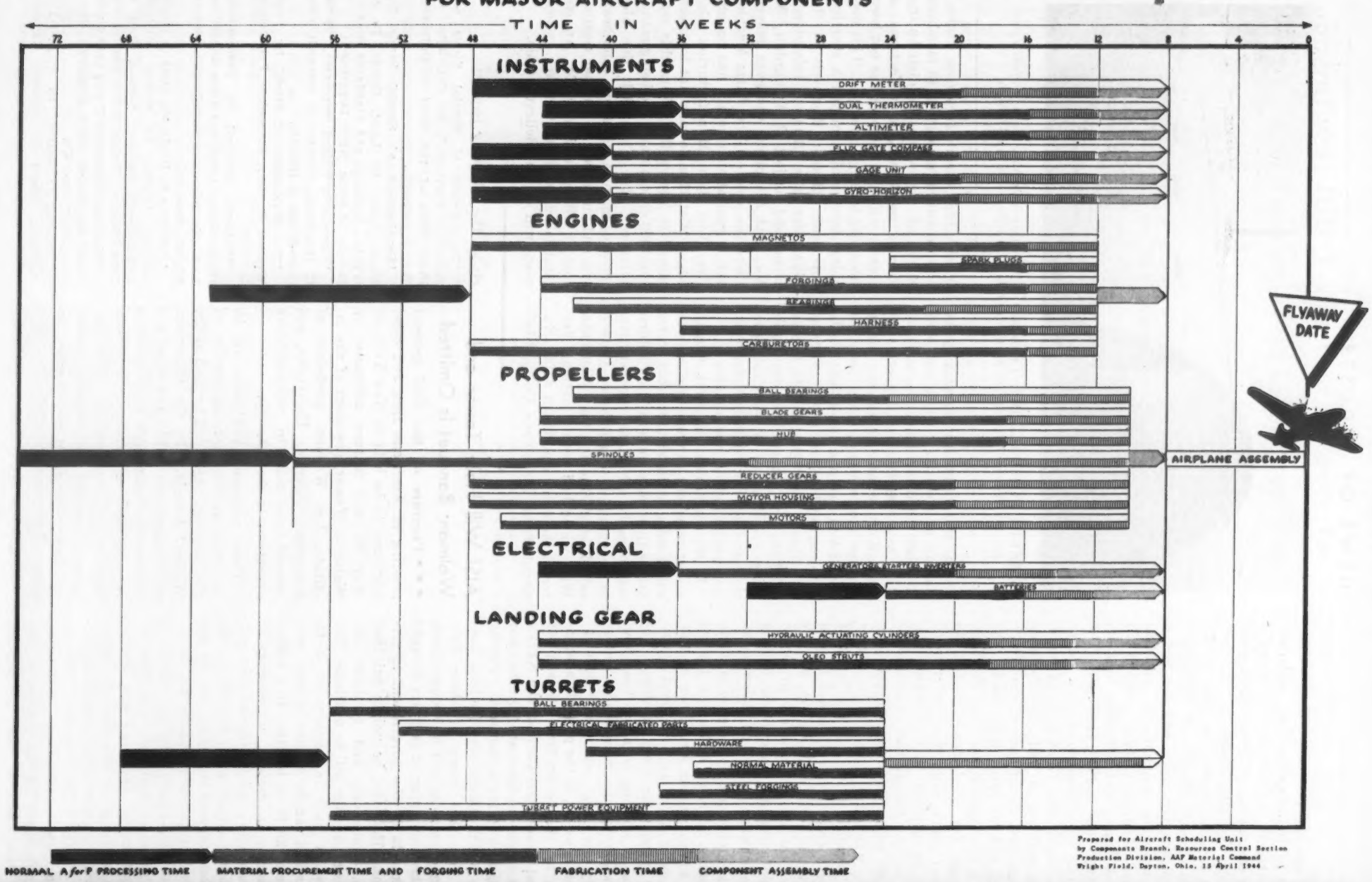
"Problems in Producing Steel to Hardenability Limits," by Wilbur Bischoff, metallurgical engineer, Timken Steel & Tube Division, Timken Roller Bearing Co.

"Electrometallurgical Treatment of Ores," by Charles Hart, president, Delaware River Steel Co.

"Accident Prevention," by W. A. Irvin, chairman, Board of Trustees, National Safety Council.

PROCUREMENT & MANUFACTURING TIME CYCLE

FOR MAJOR AIRCRAFT COMPONENTS



Prepared for Aircraft Scheduling Unit
by Components Branch, Resources Control Section
Production Division, AAF Material Command
Wright Field, Dayton, Ohio, 15 April 1944

NEW CHART: The majority of the components here portrayed are government furnished equipment. Normal authority for purchase processing time required by overall procurement cycle. This chart, like numerous others of a similar nature, was prepared by the Aircraft Scheduling Unit, Resources Control Section, Production Div[illegible]

Senate Group Appears Ready to Back Nelson in Plea for Authority

By DONALD BROWNE
Washington Staff

o o o

• • • A bipartisan bloc of conservative senators showed itself ready on April 19 to give WPB Chairman Donald M. Nelson the authority they think he needs over surplus property and contract cancellation at a hearing on the Murray-George Contract Termination Bill before the Senate Military Affairs Subcommittee. The outstanding feature of the recent reconversion meeting of automobile executives with WPB was the lack of WPB authority to deal with these problems.

Mr. Nelson, declined the Committee's offer which amounted to WPB control over the entire civilian economy in the postwar period but asked the Committee to renew WPB legislation which expires the latter part of this year. Senator Harley Kilgore, Democrat of West Virginia told THE IRON AGE that the reason for Mr. Nelson's declining was because the Committee intends to make WPB the nucleus of the Office of Demobilization sponsored by the Senate Post-War Committee and that this would upset the demobilization machinery of the Baruch report. For Administration "family" reasons, Mr. Nelson had to refuse the offer, Senator Kilgore said.

Differing with War Mobilizer, James F. Byrnes, who a short time ago predicted serious postwar unemployment, Mr. Nelson said if proper planning were done now unemployment could be avoided. He urged immediate passage of the termination bill.

"The thing to do when Germany collapses is to terminate war contracts, get government material out of plants and government machinery out of the way to make working space available at once, so that civilian production can be started on a large scale."

Questioning by Senator James E. Murray, chairman of the committee, revealed that the organization of Mr. Nelson's new reconversion committee, parallels the advisory group advocated by Senators Murray and George to assist the Director of Demobilization when that office is created. Mr. Nelson said that the new reconversion committee was not mere window dressing and that he believed that "we are going to prove Mr. Gaylord wrong."

NAM President Robert Gaylord turned down membership on the new committee on the grounds that such "partisan" committees can never agree except on very general things, and "defeat their own purpose."

Questions asked by Senator Murray showed clearly how the committee is dissatisfied with the setup of the Office of War Mobilization. The committee wanted to know who is responsible for the planning and control of war production and the difference between the functions of OWM and the Chairman of WPB—if WPB is responsible for working out the policies and programs to be followed in cutbacks of war production, what WPB's responsibility is or should be in respect to surplus war property.

Mr. Nelson replied that once the Chiefs of Staff have made decisions, that WPB is responsible for material allocation and scheduling, and while OWM is a policy body, WPB is an operating agency, that WPB under the Baruch report is to work with the services on contract cutbacks—that Surplus Property Administrator Will L. Clayton should be queried about WPB's responsibility or need for legislation with respect to surpluses, that WPB is assisting SWPA, the Maritime Commission and the Army and Navy in excess property distribution through its Redistribution Division.

Emphasizing the need for a "balanced economy" during reconversion as well as during war, Mr. Nelson announced a definite policy with respect to war plants whose contracts have been terminated. He said once it became apparent to a plant it was no longer needed by the Army or Navy for contracts for allied governments, civilian production would be permitted by WPB.

Mr. Nelson also declared that in some cases no civilian production should be started in Group I and II labor areas because of of the manpower situation, but he said that a rule of reason should be applied, indicating that reduced civilian production may be permitted in tight labor areas when warranted by the circumstances.

The Smaller War Plants Corp. function in the postwar period should be an aggressive agency to which small plants could appeal for assistance, Mr. Nelson said.

The WPB Chairman opposed dismissal wages but said he favored federal assistance to states which wish to increase unemployment compensation.

CHOW FOR BOMBERS: *Stacked aboard a landing craft, these bombs will soon be transferred to an aircraft carrier . . . fodder for the bombers which blast Japan's powerful bases in the Pacific.*

NEW CHART: The majority of the components here portrayed are government furnished equipment. Normal authority for purchase processing time required by the Aircraft Scheduling Unit Procurement Control Section, Production Division, War Department. This chart, like numerous others of a similar nature, was prepared by the Aircraft Scheduling Unit. Bottom overall procurement cycle.

NORMAL A for P PROCESSING TIME | MATERIAL PROCUREMENT TIME AND FORGING TIME | FABRICATION TIME | COMPONENT ASSEMBLY TIME

Right Field, Dayton, Ohio, 13 April 1944

Steel Wage Boost Over 7c. Per Hour May Mean Price Rise Under OPA Rules

Washington

• • • **If WLB grants** the steelworkers more than 7c. per hr. wage increase, the steel industry will be entitled to an across-the-board increase for all steel products, under OPA regulations. If WLB decides to accept the Bureau of Labor Statistics estimate that the cost of living has risen 8 per cent since July, 1942, USWA would get a 10c. per hr. increase if WLB decides to tie wages to the cost of living.

While OPA is not entertaining plans to give the steel industry an across-the-board increase largely because the wage case has not been decided, it has decided to employ the principle of "compensatory adjustment" in the interim by decreasing the price of some products and increasing the price of others. Wage Stabilizer Vinson has not requested OPA's opinion for the effect of any price increase.

The policy under which the industry will get an an-across-the-board increase was announced by OPA Deputy Price Administrator James F. Brownlee before the House Banking and Currency Committee in a hearing on extension of OPA. Mr. Brownlee said that OPA grants general price increases whenever the profits of an industry sink below the level of the base period. OPA adjusts individual prices whenever prices are below cost of production, or in the case of high cost producers. It may adjust individual prices when current profits are equal to those in the base period.

Steel industry begins presentation of its side before WLB. See page 89.

The way OPA decides whether a general increase is due is to subtract the dollar profit in the base period from the current profit to determine how much of a wage increase the industry could absorb without sinking below the level of the base period or going into the red.

An 8c. per hr. increase would cost the industry $108,563,000, including overtime for a 44.4 hour week for 503,100 workers in the basic steel industry and for 85,000 salaried workers. Annual profits in the base period taking into account the fact that OPA is getting financial data from 26 companies which represent 80 per cent of the industry, were $116,900,000. The estimated annual profits for 1944 which are based upon 100 per cent of the industry will be $222,150,000.

Subtraction of profits of the base period from estimated 1944 profits gives a cushion of only about $105,250,000 which is clearly exceeded by the cost of an 8c. per hr. increase. The cost of 7c. per hr. would be $99,388,900.

Meanwhile, OPA has agreed during meetings lasting three months with the Steel Industry Advisory Committee that the prices of rails, structurals, bars, strip and sheet be increased. OPA has also agreed to increase prices of maximum analysis extras for SAE 3100-4100 steels to a point where the maximum prices approximate the prices for corresponding NE steels.

Maximum analysis extras for NE steels of the 8600-8700 series will be decreased along with prices for rolled armor plate, propeller blade steel and for bullet core steel. It is assumed that price increases allowed by OPA, provided no across the board increase is necessary on account of wage increases, will be high enough to compensate the industry for any retroactive pay which may be ordered by WLB below 8c.

The OPA decision to take under consideration both upward and downward adjustments was made after the agency had rejected industry proposals, for an average price increase of $7 and later for $4.40 a ton.

OPA calls its technique of pushing some prices up and other prices down "compensatory adjustment" because one movement is supposed to counterbalance the other.

Prices were upped on those grades of steel which will be suitable for peacetime uses and pushed down on "war babies." Steel industry representatives have told OPA that the prospective price jumps will in fact outweigh the price cuts, mostly because more tonnage will be involved in the increase.

Although OPA appears convinced of the justice of the steel industry price proposals, at one recent meeting the agency's enthusiasm simmered down to advocacy of merely a "token" increase to show good faith.

The steel companies' argument for price increases are: (1) Costs have gone up because of the 48 hr. work week and its time-and-a-half overtime pay; (2) portal-to-portal pay; (3) the necessity of hiring green workers and woman power in the mills which are less efficient; and (4) net income has been reduced by increased demands for products which are less profitable.

MARCH BLAST FURNACE OUTPUT—NET TONS

Source: American Iron and Steel Institute

	PRODUCTION						
	Pig Iron		Ferro-Manganese and Spiegel		TOTAL		
	Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date	March Per Cent of Capacity
DISTRICTS:							
Eastern	965,674	2,867,717	23,187	63,187	988,861	2,930,904	91.1
Pittsburgh-Youngstown	2,211,897	6,354,331	28,868	72,390	2,240,765	6,426,721	98.5
Cleveland-Detroit	561,059	1,575,889			561,059	1,575,889	100.0
Chicago	1,137,509	3,405,679		8,780	1,137,509	3,414,459	98.9
Southern	349,702	1,033,866	11,515	48,885	361,217	1,082,751	96.4
Western	144,829	407,993			144,829	407,993	72.0
Total	5,370,670	15,645,475	63,570	193,242	5,434,240	15,838,717	96.2

During 1942 the companies included above represented 99.7% of the total blast furnace production.

Priority Aid Handled By WPB District Offices

• • • **WPB last week** announced that applications for priorities assistance and allotments of materials with which a person will make a Class B facility for his own use should be filed with the nearest WPB field office. WPB erroneously stated in a release issued March 30, that such applications should be filed with WPB in Washington.

Open Hearth Conference Hears Roemer Warn Against Over-Optimism

Pittsburgh

• • • **Talk** these days, about postwar problems, postwar planning and postwar projects, is serving as a deterrent to production, and has the effect of creating a mass psychology that everything is over except the shouting, is the opinion of Henry A. Roemer, chairman and president, Sharon Steel Co., who addressed the National Open Hearth and Blast Furnace and Raw Materials Conference of the AIME here on April 20.

To the guests at the annual dinner, Mr. Roemer said: "Let's do the job first. Let's get this war finished and over with before we devote too much time or talk to the postwar picture, which may be materially changed if a complete victory is not accomplished. Let's give our boys overseas a chance to return home and help us paint the picture of our postwar world."

Warning against over-optimism, relative to the early closing of the war, Mr. Roemer said, "Let us not be too sanguine about the progress which has been made—or overly optimistic about the early closing of the war—the road ahead seems difficult and dangerous and the final cost of victory will be tremendous as measured in the blood of our fighting forces and the loss of equipment which is bound to occur once that the real invasion of Continental Europe gets under way."

J. L. Perry, president, Carnegie-Illinois Steel Corp., praised the assembled engineers, production men and metallurgists for their fine contribution to the science of steel making, through the fields of technical investigation and research.

Commenting on the place of the engineer in the postwar period, Mr. Perry said that "this will be a test of the best thought and abilities in all fields of endeavor." "More than ever before," he added, "will be the engineer in the vanguard.

Small Firms in Farm Equipment Field Complain Over Inability to Get Steel

• • • **Severe criticism** of arbitrary WPB allotments of steel and refusal to make minor adjustments is voiced by small manufacturers of farm equipment specialties.

Resentment centers around reported allotment to Ford-Ferguson of steel to manufacture 25,000 tractors in the Detroit critical area and the concurrent refusal to grant the local manufacturers in remote areas even a few tons. This feeling is intensified by abandonment of concentration of manufacture of many types of implements in the hands of smaller manufacturers under last year's program, and the return this year of much of this work to the larger firms now that they have been released from war manufacturing obligations.

A California firm making special cultivation and traction equipment designed for local conditions is quoted as stating that "the WPB turned thumbs down on our appeal. All we asked was for 10 more tons of new steel per quarter (which was locally available in unlimited quantities). . . . The Ford-Ferguson people were permitted to build 25,000 additional tractors. It certainly pays to operate on a large scale."

A specialty manufacturer of ensilage cutters wrote, "this year under L-257 we are reduced to 69 per cent (of 1941 production), which is a cut of 23 per cent (from last year). Overall production of the industry is practically doubled which puts us in a very unfair position with our competitors.

"**Recently** we made a new application for only 26 tons of new steel allotment because we were able to get the rest of the steel from excess stock through the steel recovery division. We promptly received this allotment but within 48 hr. it was annulled. They claim there is no steel available for us, although we noticed they were able to allot the Ford Motor Co. enough steel to make 25,000 tractors and yet when we could produce 200 badly needed ensilage cutters with only 26 tons of additional steel, we were unable to get to first base."

An Idaho manufacturer of ditchers indispensable to the construction of irrigation ditches in the arid sections of the far west, reports: "The production of ditchers has been so limited by the WPB that we were allowed only enough material to build less than one-fifth of the number of machines for which we had orders on Feb. 1."

Distribution of equipment by the War Food Administration also has been under fire in the far west. Far western areas producing specialty crops requiring large amounts of machinery protest against the WFA's method of allocating tractors to the states upon the basis of numbers of machines on farms in a base year. The westerners contend that "where intensive agriculture is carried on, where crops require more cultivation and more horsepower hours, and where two crops per season are often raised on the land, then the same number of tractors do double service, wear out faster and should be replaced oftener." It is contended that value of crops produced should determine allotment.

SOCIETY OFFICERS: *The Chicago Technical Societies Council officers elect included: (seated, left to right) G. P. Halliwell, treasurer, of the AIME; T. S. McEwan, president, of ASME; and B. E. Schaar, vice-president, of American Chemical Society. Standing are, left, Paul S. Smith, recording secretary, Institute of Radio Engineers; and, right, K. H. Hobbie, corresponding secretary, of American Society of Metals.*

Electricweld Pipe and Tubing in Rapid Production Gain During War

By TOM CAMPBELL
Pittsburgh Editor

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• • • Electricweld pipe and tubing production, in 1943, not only increased 153 per cent over 1939 output, but also raised its percentage of total output from 12.4 in 1939 to 20.3 in 1943. Much of this growth in trend of electricweld pipe and tubing has been ascribed to war needs, but producers of this type of product are insistent that the gain will by no means be lost when the next so-called "normal" period materializes.

Seamless pipe and tubing production, in 1943, increased about 61 per cent over 1939. The tremendous demand for seamless products, not only for war material but for essential civilian items, was enough to cause seamless production to retain its relative importance with respect to total pipe and tube output. In 1939, seamless pipe and tubing constituted 46.2 per cent of total output, and in 1943 reflected about 47.6 per cent of tubing production.

The 1943 production, used in this study, is a preliminary figure, obtained from the American Iron and Steel Institute Report No. 10. This is slightly different from the annual statistical report, which pro-rates the various pipe and tube products among the correct methods of manufacture. In this case, the tonnage shown on the 1943 AIS 10 report for mechanical tubing, was pro-rated to seamless and electricweld on an 80-20 basis—the approximate ratio which existed in 1942. Because of the substantial increase in electricweld for airplane tubing, in 1943, actual figures, which will be released in June, may show a slightly better percentage participation in 1943 for electricweld; but the figures in this study are believed to approximate what later analyses will show.

Interesting, from the standpoint of earlier predictions in some quarters, is the production of lapweld pipe in 1943, which showed a 46 per cent increase over 1939. Some pipe producers, a few years ago, held the opinion that lapweld pipe was "all washed up." Nevertheless, on a percentage of total output basis, lapweld pipe in 1939 was about 10 per cent of total pipe and tubing output, and in 1943 was about 9.5 per cent. Unconfirmed reports in the trade, have been to the effect that some pipe, although classified as lapweld, but made by another process, has been shipped at various times in the past few years. The amount of such substitutions, however, if made, did probably not constitute too great a percentage of the total lapweld pipe made in 1942 or 1943.

Buttweld pipe and tubing showed the least increase in 1943, compared to 1939. In the latter year, output was 1,179,000 tons, compared with 1,326,000 tons in 1943; an increase of 13 per cent. Buttweld pipe output, in 1941, reached an all-time peak when 1,818,000 tons were produced. This substantial expansion was due to the tremendous activity in the construction of war buildings and military camps, along with certain civilian endeavor which had not yet been drastically curtailed. In 1939, buttweld pipe production constituted slightly more than 31 per cent of total pipe and tubing output, but by 1943 it had slid off to 22.6 per cent. It is not believed, however, that this is a permanent trend. Because of wartime restrictions, building activity has been substantially curtailed; but in the peace era to come, the probability is that various types of construction activity, requiring buttweld pipe, will be expanded enough to cause a reversal in the percentage of participation trend for the buttweld product.

An analysis of the figures shown in this story does not indicate that the primary position of seamless pipe and tubing is in danger of being toppled. There is ample proof, however, that electricweld pipe and tubing production not only has gained considerably but will, in all probability, under certain conditions, present competition with seamless for new business.

The production of all types of pipe and tubing, in 1943, increased about 56 per cent over 1939, as contrasted with a 75 per cent increase during the same period for total finished production of all steel products.

TRENDS IN STEEL TUBES & PIPE FOR SALE

1939-1943 Net Tons (000) Omitted

Source—American Iron & Steel Institute Compilation—The Iron Age

YEAR	PIPE AND TUBE PRODUCTION				
	Seamless	Lapweld	Buttweld	Electricweld	Total
1939	1735	382	1179	468	3764
1940	1960	384	1375	554	4273
1941	2535	529	1818	805	5687
1942	2529	569	1448	688	5234
1943*	2800	560	1326	1200	5886
Per Cent Increase 1943 Over 1939	Plus 61	Plus 46	Plus 13	Plus 153	Plus 56

* Preliminary; Mechanical Tubing output on AIS 10 prorated to Seamless and Electricweld on 80-20 basis.

METHOD OF PIPE AND TUBING OUTFIT IN PER CENT OF TOTAL PIPE & TUBING PRODUCTION

1939-1943

Source—American Iron & Steel Institute Compilation—The Iron Age

YEAR	PER CENT OF TOTAL OUTPUT			
	Seamless	Lapweld	Buttweld	Electricweld
1939	46.2	10.1	31.3	12.4
1940	45.9	9.0	32.2	12.9
1941	44.6	9.3	32.0	14.1
1942	48.4	10.9	27.4	13.3
1943	47.6	9.5	22.6	20.3

GM Will Expedite Materials for 1,000,000 Autos, Trucks at War's End

Washington

• • • **Reconversion plans** for the General Motors Corp. were submitted last week to the House Postwar Committee by President C. E. Wilson and among other things provide for the immediate ordering as soon as the war ends of materials for the production of 1,000,000 cars and trucks and other products made by the corporation. Consisting of six points the program contemplates that General Motors "must promptly return to the production of more and better things for more people," with the realization that private enterprise must bear the brunt of providing this postwar activity. The government's function, Mr. Wilson said, is to clear the way for private enterprise to do a successful job.

Pointing out that General Motors realizes that the war is yet to be won, Mr. Wilson said when "victory is ours," the General Motors plan will be put into effect and executed progressively and in proper timing as the rigid requirements of a war economy make possible and the rules, regulations and cooperation of the government permit. General Motors, Mr. Wilson said, probably has an even greater problem of reconstruction, rehabilitation and reorganization than others in the automotive industry.

In general outline the plan is:

General motors will ask the government and the services to define production facilities belonging to the corporation and those the corporation or others have been operating for the services which will be made available for commercial products. It will also ask what equipment will be declared surplus and what plants and equipment, if any, will be held as a military reserve for insurance and as a part of the national defense. It will likewise ask for a clearly defined plan for the prompt termination of contracts, including the handling of work in process, inventories, and commitments and the liquidation and disposition of all surplus equipment which may be declared available.

Peacetime production will be resumed as promptly as possible, being substantially the 1942 passenger car models and other products which were in production when war was declared.

All operating divisions will make lists of machine tools and equipment which have been scrapped, sold to other contractors or the government for war production, as these machines and equipment must be promptly replaced either from surplus equipment available from former war production activities or by purchase of new equipment. If conditions permit, toward the end of the war, and after all machine tool requirements for war production have been filled, orders will be placed with machine tool builders for much of this equipment as will not be available through prompt release of war machinery.

The corporation will authorize the prompt ordering of materials required to produce 1,000,000 cars and trucks and an equivalent quantity of other products it produces, and at the earliest possible date when the war is over, telegrams will be sent to all suppliers and subcontractors authorizing them to start production immediately. This material will be accepted, even though some of it can be produced faster than actually required, in order to give the quickest possible employment and allow suppliers to proceed.

As soon as conditions permit, and some of this work may be possible during the war, research development will be resumed.

GM will appropriate the hundreds of millions of dollars necessary for a substantial increase in its prewar production capacity for cars, trucks, household appliances, diesel engines and diesel electric locomotives.

Immediately after the war, a plan for the purchase of buildings from the government or others, or the construction of new facilities to carry out the program will be effected.

At the right time the corporation will again fill its research, engineering and development staffs and aggressively continue its past policy of continuing product improvement.

Hull Creates New Cartel Unit

Washington

• • • **Secretary of State** Cordell Hull last Thursday announced the formation of a new industry branch in the Commodities Division of the Office of Economic Affairs to deal with problems surrounding international cartels in the postwar period.

Directly responsible to Assistant Secretary of State Dean Acheson, the work of the new unit will be directed by Harry C. Hawkins, a department career man who heads up the Office of Economic Affairs. At the operating level, Bernard Haley, chief of the Commodities Division, will see to the carrying out of policies laid down by Mr. Hull to govern the branch.

Secretary Hull specified that industry branch activities should include the following:

1—Assembling and analyzing basic data and information and preparing background and policy studies on international cartels, intercorporate relations of the United States and foreign firm, patent and other market regulating agreements, trademarks and trade names, intergovernmental industrial agreements.

2—**Development of** policies and programs for controlling cartels, combines, restrictive patent agreements and other restrictive international business arrangements.

3—Formulation of policy on matters of international industrial arrangements involved in the treatment of industry in enemy and ex-enemy countries during military occupation.

4—Review of legislative proposals relating to foreign contracts, patents, trade marks and cartels.

5—Policy advice to divisions of the department and other federal agencies with regard to current supply arrangements involving industrial combines, cartels and similar problems.

"During the coming period of peace settlement, postwar adjustment, industrial rehabilitation and revival of international trade, cartel problems will be a major concern in international affairs," Mr. Hull declared.

OPA Clarifies Price Order By Changing Definition of "Warehousing"

Washington

• • • **Changes in its** definition of warehousing of iron or steel products were announced by OPA so that sales entitled to the warehouse price level could be more easily distinguished from sales of these products at the mill producer level. These changes are made by Amendment No. 22 to RPS No. 49.

OPA explained that sales of warehouse materials are entitled to a higher price ceiling. Under the old definition it had been difficult in various situations to determine whether the transaction involved should be classified as a warehousing operation and therefore subject to the higher ceiling.

The changes, effective April 27, 1944, are being made at this time to conform to modifications in WPB regulations governing the purchase and resale of iron or steel products. Another reason for clarification is the large number of problems anticipated because of the increasing availability of iron and steel products, because of cutbacks and cancellations of war contracts resulting from readjustments in war contracts.

These changes modify Section 1306.-157 (s) of RPS No. 49 (Resale of Iron or Steel Products) by:

1—Removing the requirement that the premises where the products were received and unloaded must not be "a public warehouse." Substituted for this is the requirement that warehousing operations must be performed on premises maintained and operated by an owner of the material at the time it is put through such operation.

2—Amending the condition that material must be purchased by the reseller "under the authority granted by applicable WPB regulations governing the purchase and resale of iron or steel products in substantially the same form as received" to include a limitation that material be purchased under authority to deliver into stock for resale in subsantially the same form as received.

The dual price stucture in RPS No. 49, OPA declared, "reflects that which developed in the industry under normal marketing conditions and results from the fact that warehousemen render services which add to the utility of the products and have costs and assume risks which distinguish them from persons who merely act as intermediaries between producers and buyers. Persons operating warehouses ordinarily maintain inventories which enable them to make prompt deliveries and to sell in quantities too small to be conveniently handled by mill producers.

Price Briefs

Casket handles—Casket manufacturers who have reintroduced metal handles which were sold by them in March, 1942, cannot increase the maximum price for these handles over the highest price they charged during March, 1942. (Release No. OPA-T-1986)

●

Machines and parts—Maximum prices for modified machines and parts are to be determined by adding or subtracting the maximum price of the original machine or part, the increase or decrease in factory costs resulting from any change in the machine or part since the base date. Amdt. 115 to MPR 136. (Release No. OPA-T-1988)

●

Radio receiver tubes—Sales are now permitted between manufacturers of civilian type radio receiver tubes pursuant to WPB scheduling programs at the seller's maximum net price for sales to distributors, less a 20 per cent discount. Amdt. 7 to RPS 84.

●

Renegotiation regulations—Regulations governing renegotiation of war contracts for fiscal year ending after June 30, 1943 have been released. (Release No. OWI-3118)

●

Second hand machine tools—Five changes have been made in the regulation establishing maximum prices for sale of second hand machine tools and extras. Amdt. 4 to MPR 1. (Release No. OPA-T-1975)

●

Typewriters—Change in maximum price regulation for the sale and rental of used typewriters re-establishes ceiling prices for dealer-to-dealer sales at two-thirds of the retail ceilings. Retail prices are not changed. Amdt. 2 to MPR 162. (Release No. OPA-4205)

Value Deliveries Rescheduled

Washington

• • • **To effect** a more balanced distribution of valves and pipe fittings to the various war programs, WPB has issued Direction 1 to Table II (Shipbuilding Division Table) of order M-293. Manufacturers of valves and pipe fittings are directed to reschedule shipments of these items for use in destroyer escort vessels in accordance with the "Schedules of Required Shipping Dates for Ship Piping Systems" now in effect, or as they may be revised. The schedules are issued by the Bureau of Ships, Navy Department, through the Office of the Inspector of Naval Material.

The destroyer escort program recently has been revised, the WPB Shipbuilding Division said, and accordingly there are orders on manufacturers' books originally calling for delivery far in advance of the delivery date now actually required. Under Priorities Regulation 1, a manufacturer who knows that the delivery date given on an order is earlier than actually required, because of a change in circumstances, may delay his shipment. Direction 1 to Table II requires the manufacturer to reschedule delivery of an order which has been postponed, when it is identifiable as belonging to the destroyer escort program.

WPB Is Preparing Steel Expansion Data

Washington

• • • **Preparation by** the WPB Steel Division of a comprehensive report on all steel expansion projects, including both those publicly and privately financed, set up within the industry between Jan. 1, 1940, and June 30, 1944, was the principal topic of discussion at the recent initial meeting of the Steel Forms and Reports Industry Advisory Committee. W. A. Hauck, presiding officer, explained that the projected report will cover the entire field, from ore mining to finished products, and will be broken down company by company, indicating the contributions made by government financed and company financed additions to plant.

Committee members, according to a WPB statement, were told of the extent of the information being supplied by WPB to OPA in connection with the latter's studies on steel prices, and of the information being developed by the Steel Division, at the request of the War Department, to enable steel producers, by use of an overall industry formula, to arrive at the proportion of government shipments subject to negotiation on "B" products, shipments to warehouses and shipments for further fabrication.

WPB Slows Down on Easing Its Material and Limitation Orders on Metals

Washington

• • • **The easing of** limitation orders on the use of critical materials by WPB has somewhat subsided during the past week or so, with only a few changes reported in such orders this week that will permit wider use of such materials. Oil well drillers in specified areas of Illinois, Indiana, and Kentucky were allowed additional materials in oil well drilling operations through a revision of supplementary order No. 5 to Petroleum Administrative Order No. 11. The revision is intended to provide additional drilling to develop the multiple pool fields in these areas and augment the deficient supply of crude in the Midwest. While this is not a WPB relaxation, it does involve critical materials.

WPB lifted restrictions on the construction of certain railroad operating facilities, such as tunnels, overpasses, and bridges, not exceeding $2500 in cost of materials used. This was covered in the amended order P-142, and relieves operators of certain provisions of order L-41.

Public highway and street construction under federal, state or other governmental jurisdiction has been removed from control by L-41 and placed under a special order L-41-e. Such projects may be started without specific WPB authorization if they (1) do not cost more than $5000 per mile and the total cost does not exceed $25,000; (2) cost $10,000 or less; (3) provide access to sources of raw materials as provided in section 6 of the Defense Highway Act of 1941 when such project is certified as essential by WPB; (4) are owned by any or several named agencies of the government.

Restrictions on the use of zinc in padlocks and manufacture of certain sizes heretofore prohibited is permitted under the amended schedule I of order L-236.

Domestic cooking stoves may again be constructed with storage compartments by an amendment to order L-23-c. Also, production of five instead of two fuel oil circulating stoves is permitted under the revised order.

On the other hand, enameled ware producers were told that container board and manpower were the limiting factors in production of these items. Under L-317, only 70 per cent of 1942 container board consumption is permitted, which may cause a drop of 25 per cent in shipments of enameled ware. A recent amendment to L-30-b permitted wider ranges of sizes of enameled ware.

Dairy equipment and machinery manufacture will not be relaxed until military requirements are on the decline, members of this industry were told by WPB. Quota schedules on a tonnage basis rather than a unit basis were suggested and met with industry approval. Rubber, stainless steel, and lumber are the highly critical items of this industry.

Registers and grilles for warm air heating systems are in short supply, and a limitation order may be issued shortly to provide for production of these items on the basis of stated requirements from claimant agencies. There are no requirements under the present set up, production being permitted under order M-126 but only from bessemer or top cut steel and confined to labor areas III and IV. Grille production, under M-126, is prohibited except for those made for use on shipboard.

"Blanket" License Exports Permitted

Washington

• • • **The Foreign Economic** Administration has announced a list of commodities that may now be exported, under a single "blanket" license, to more than one consignee in any Latin American country that does not require Import Recommendations for these commodities. It has previously been necessary for exporters to submit separate applications for licenses to export to each consignee.

The new procedure, effective immediately, is known as the BLT or "blanket" license provision. It will minimize paper work for United States exporters and make it possible for them to schedule business further into the future. Commodities that now may be exported under blanket license include: Iron and steel (cutlery, nails and bolts, stoves, tools, etc.); electrical machinery and apparatus; machinery (printing and bookbinding); abrasives; brass and bronze; office supplies; precious metals and vehicles.

The blanket license procedure is at present applicable only to those Latin American countries that do not require Import Recommendations or similar documents for the commodities involved. The commodities for which import requirements have been waived vary for different countries. The detailed lists, carried in earlier export bulletins, are in the hands of United States exporters.

Priority Changes

Blanket licenses—A list of commodities that may now be exported under a single blanket license to more than one consignee in any Latin-American country that does not require Import Recommendations for these commodities has been announced by FEA. FEA Current Export Bulletin No. 153. (4-18-44)

Delivery changes—Changes in scheduling procedures for industrial and mechanical instruments, control valves and regulators, listed in the amended Table 9 of M-293. (4-17-44)

Mining equipment—Delivery promises must be maintained, although most of the manufacturers of mining equipment have been relieved from filing the subject schedules. (4-17-44)

Oil burners—Minor changes applying to distribution of oil burners to relieve paper work have been made. L-74, as amended. (4-20-44)

Railroad construction—Restrictions on the construction of certain railroad operating facilities, not exceeding $2500 in cost of materials used, have been lifted. P-142, as amended. (4-19-44)

Road construction—The term "construction" and "maintenance and repair" as applied to public highways and street construction has been defined and limits under which construction work of this type can be undertaken without WPB permission has been prescribed. L-41-e. (4-20-44)

Steel—Controls over the use of iron and steel in a certain number of articles have been brought into line with controls exercised by various limitation orders. Amdt. 1 to M-126. (4-19-44)

Steel tubing—Restrictions on the use of seamless steel tubing and the wall thickness of the tubing permitted have been removed. Sched. 3 to L-126. (4-17-44)

Tantalum—The quantity of tantalum which may be delivered or received without authorization from WPB has been increased. M-156, as amended. (4-19-44)

Valves—Manufacturers of valves and pipe fittings have been directed to reschedule their shipments for use in destroyer escort vessels in accordance with new ruling. Dir. 1 to Table II of M-293. (4-19-44)

Welding equipment—Owners of used, idle resistance welding equipment are not required to report their stocks to WPB. L-298, as amended. (4-17-44)

Government Sponsored Metal Ingot Stockpiling vs. Ore and Scrap Storage

By MAX STERN
Manager, Metals Recovery Division, Loma Machine Mfg. Co.

• • • **The problems** of reconversion after this war will be similar to those of the postwar period in Europe in 1919 and in the early 20's, during which time the writer was engaged in an important capacity in European heavy industry and aided in demobilizing both the victorious and defeated countries. Some suggestions now, based on these experiences may be helpful. Of course, the enormous differences in quantity and quality between the demobilization effort then and now, between Europe and America should be realized, but in principle a demobilization is an incision into any nation's life as drastic and as deep as the mobilization itself. Demobilization after the last war had the serious function of absorbing the financial hangover from the war, and it also meant a return from cheerful government spending to tight-lipped private finance. After this war, however, an entirely free economy cannot be achieved, and government controls will demain of paramount importance at least during a period of adjustment.

This discussion will be confined entirely to the engineering aspects of the problems of demobilization. The incendiary bombs of cancellation of contracts, disposal of plants, etc., are not within the scope of the writer.

The "outbreak" of peace means for war production sudden stoppage of the moving belt; half finished tanks stopping in their tracks in the arsenals; half hatched birds of war stalling on the assembly line; thousands of Radar sets blocking the production line; and dozens of ships unfinished in their ways. From this must start reconversion. But how, without wrecking industry?

The cessation of hostilities may mean unemployment for millions until peacetime production can be resumed; with millions of tons of metals, rubber, glass, plastics, and textiles subject to legal harangues and bargaining until their situation is clarified. A conception called "production in reverse" is proposed for this moment in the nation's industrial life.

When assembly lines are halted, "production in reverse" begins. The tank travels back on its production lines and is scrapped. The Radar set is taken apart. The airplane is dismantled. The ship is wrecked by the same crews that were bent on its construction. These crews with their engineers know how to take apart the tools of war which they were building. They know the components that went into the parts and they know the suppliers as well as the physical properties of the myriad of parts making a mechanized army. This "production is reverse" can keep the war plants busy until the production lines for peacetime goods are set up again and until the bulk of war equipment on hand has been scrapped.

Scrap thus produced should be treated and segregated on the spot under the inspection of the same government agents who are now watching the construction of the materiel. They must supervise the careful segregation of scrap, and they have to make sure that useful goods find their way back into civilian life. Finally, they must prevent war equipment from being sold directly or indirectly for war purposes. Enormous profits make the circumvention of genuine scrapping of war equipment particularly desirable and the process must be subject to rigorous control. Experiences in Germany after the last war may be a warning in this direction.

While peacetime production is being prepared in other parts of war plants, assembly lines will deal with equipment on hand. As the various plants resume peacetime production, "production in reverse" will fall off proportionately. As war scrap is to be brought from further afield and eventually from the battlefronts, only a few plants will continue on the reversed production program. Some DPC plants may be kept exclusively busy for many months in this manner.

While this scheme of "production in reverse" applies to all war equipment, it applies especially to the shipyards. Rifle manufacturers can resume typewriter production; tank manufacturers can begin construction of cars, locomotives, or cranes again; and manufacturers of automotive equipment can resume production of automobiles. But shipyards only build ships, and they can be engaged in wrecking large fleets built exclusively for wartime use. In Europe many important shipyards were working on wrecking for years after the last war, with which the writer was in close collaboration. These yards could keep their skilled labor through times of depression.

Sorted and segregated scrap should be passed on to scrap dealers and

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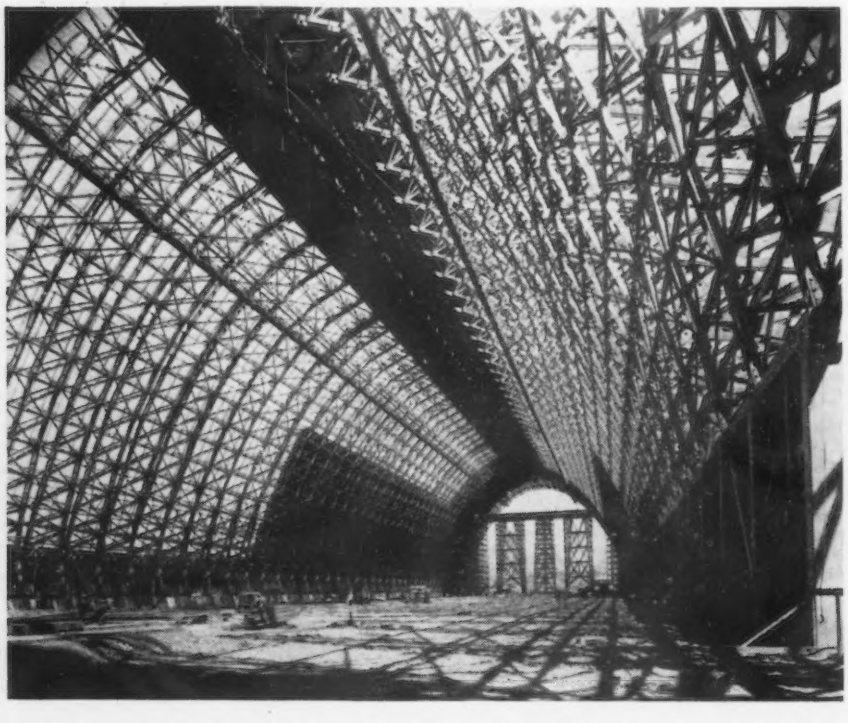

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brokers who normally handle this material. It must be realized that uncontaminated scrap is still essentially a "strategic material." Ores were mined, concentrated, smelted, and alloyed to produce the many metals. It would be folly to waste this valuable material by stockpiling it as untreated scrap. The scrap available from "production in reverse" should be used immediately by metal refiners and by iron and metal foundries. No stockpiling should be considered at a level below the ingot. Extensive experiences in Europe in this field after the last war were convincing of the importance of avoiding unnecessary hoarding and moving of scrap. It results in losses, confusion, and waste. However, when accordingly handled, it will be used up in about 1½ years after Armistice. Unless a plan for the immediate use of war scrap is developed, the valuable alloying elements will trail through steel analyses for dozens of years after the war, will be wasted, and become a real nuisance.

It is evident that such a program of scrap planning can only operate under government supervision to prevent scrap dumping which might cause a depression throughout industry from mining to manufacturing. It might be thought that this program would endanger mining industries by displacing the use of ores with increased scrap-melting. It is impossible that this will happen. The following regarding stockpiling of metals may explain this.

It has been proposed that government stockpiles of ores and metal scrap be created for emergencies. It is believed that stockpiling should take place at the stage of high quality metal ingots rather than at any other level in the flow of materials. In case of an emergency, the bottlenecks of smelting and refining would still exist. Therefore, both the scrap returning from demobilization and the ores from the mining industry should find their way into an ingot stockpile large enough for one year of total war which can be drawn on at any time when the nation's interests are at stake. This should include at least 25,000,000 tons of pig iron and 25,000,000 tons of carbon steel ingots.

Stockpiling ingots has numerous advantages over stockpiling ores. While ore stockpiling will keep mines operating, the remainder of industry will in no way benefit from the program. However, industry as a whole would participate in the production of ingots. Railroads and shipping companies would have the benefit of

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ore and scrap transportation. It is simpler to stockpile and protect ingots than ores and scrap, these being more prone to weathering and deterioration in storage.

An "ever-stable granary" is proposed for the metal industries. That is, metal producers should operate at a given percentage of rated capacity, fixed by the government for each industry and sufficient to secure the flow of ores and scrap in normal production. If commercial demand falls below this output, the difference will be absorbed by the government for its stockpiles.

The suggestion that stockpiles consist of only refined and first class metal is furthermore based upon the necessity that the entire stockpile, owned by the government and blocked perhaps for many years, be a current asset of international value comparable to that of gold. If the problem is thus handled, it is the writer's belief that the availability of tremendous stocks of war-important raw materials, coupled with the facility for quickly converting industry to war production, would give the United States a protective armor unparalleled by that of any combination of countries in the world. America would be in a position to maintain peace and discourage any future aggressor.

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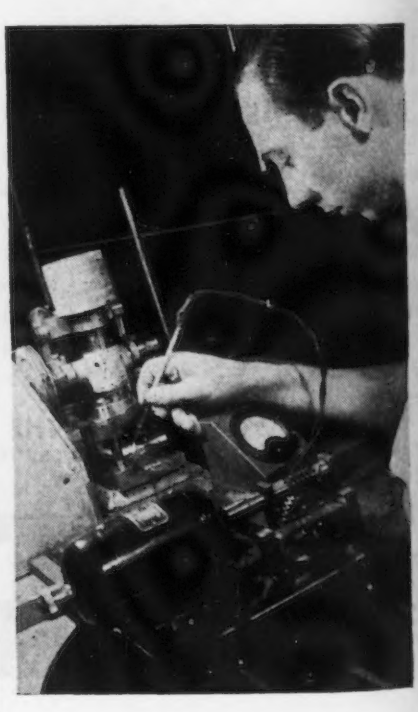

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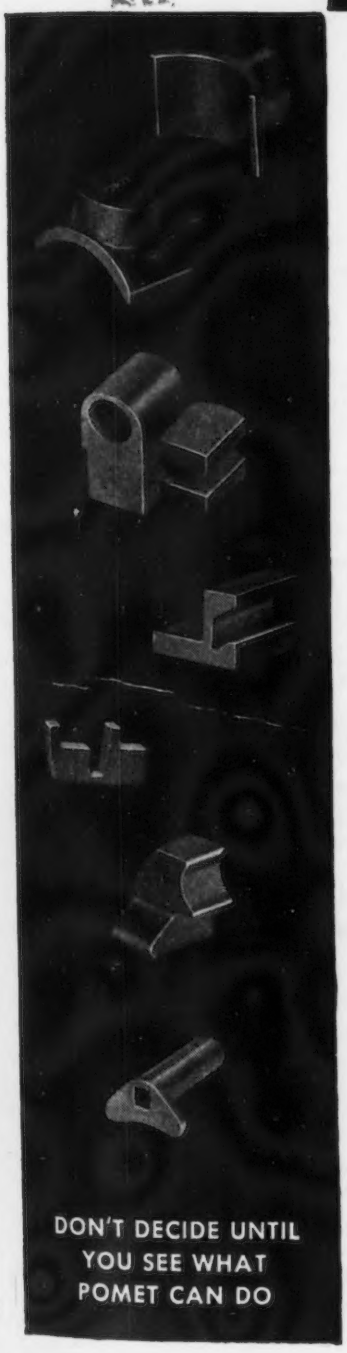

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WEAR RESISTANCE

POWDER METALLURGY CORPORATION

A SUBSIDIARY OF GENERAL BRONZE CORPORATION

30-42 Greenpoint Avenue **Long Island City, N. Y.**

Warehouse Association Chapters Elect Officers

Cleveland

• • • **The American Steel** Warehouse Association announced that several chapters have held elections of officers for the coming year. These chapters, along with their new official rosters, are as follows:

Baltimore

President—Henry A. Lowry, Seaboard Steel & Iron Corp., Baltimore.
Vice-president—Arthur Pfeifer, Dietrich Bros., Inc., Baltimore.
Secretary—J. D. Boan, U. S. Steel Supply Co., Baltimore.
Chapter director—George J. Parke, Eagleston-Parke, Inc., Norfolk, Va.

New England

President—Quincy W. Wales, Brown-Wales Co., Boston.
Vice-president—Murray C. Harvey, A. C. Harvey Co., Allston, Mass.
Vice-president—G. M. Congdon, The Congdon & Carpenter Co., Providence, R. I.
Secretary-treasurer—C. S. Harvey, A. C. Harvey Co., Allston, Mass.
Chapter director—George Putnam, Geo. F. Blake, Inc., Worcester.

Northern California

President—Howard M. Taylor, Taylor & Spotswood Co., San Francisco.
Vice-president—J. C. Hickinbotham, Hickinbotham Bros., Stockton.
Vice-president—Curtiss Hayden, Dunham-Carrigan & Hayden Co., San Francisco.
Secretary—R. D. Cortelyou, 415 Rialto Bldg., San Francisco.
Chapter director—Howard M. Taylor, Taylor & Spotswood Co., San Francisco.

Pacific Northwest

President—E. O. Rauh, Marshall-Wells Co., Portland, Ore.
Vice-president—O. J. Ulrich, Pacific Machinery & Tool Steel Co., Portland, Ore.
Secretary-treasurer—H. F. Morrow, Pacific Metal Co., Portland, Ore.
Chapter director—S. F. Woodbury, Woodbury & Co., Portland, Ore.

Southern California

President—E. Jungquist, Percival Steel & Supply Co., Los Angeles.
Vice-president—Wayne Rising, Ducommun Metals & Supply Co., Los Angeles.
Vice-president—Wm. L. Rawn, R-J-M Co., Los Angeles.
Secretary-treasurer—W. H. Lindberg, Earle M. Jorgensen Co., Los Angeles.
Chapter director—E. Jungquist, Percival Steel & Supply Co., Los Angeles.

Washington

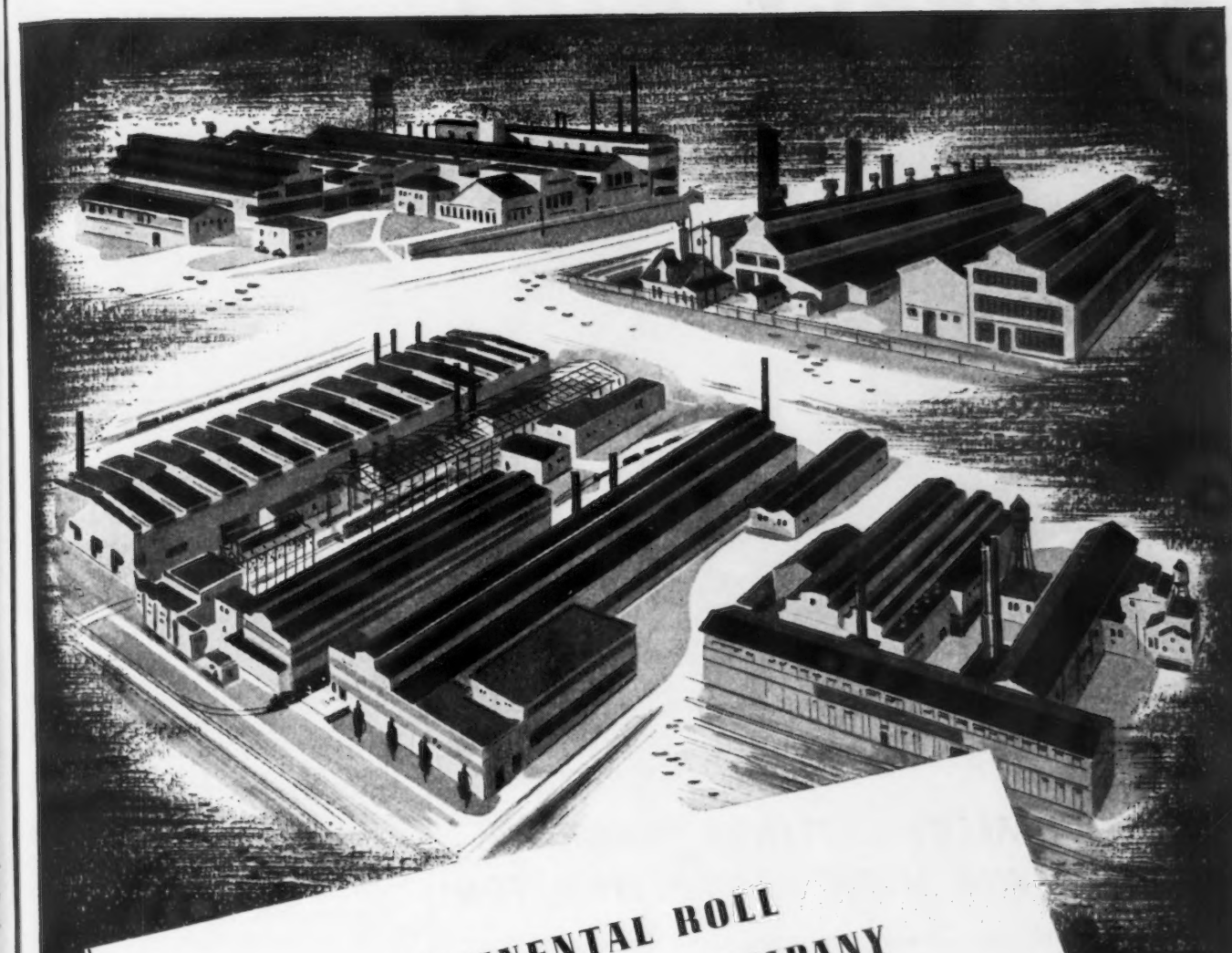
President—W. R. Case, Seattle Steel Co., Seattle.
Vice-president—J. C. Richards, Hunt & Mottet Co., Tacoma.
Secretary-treasurer—A. S. Allen, Jr., Seattle Hardware Co., Seattle.
Chapter director—A. S. Allen, Jr., Seattle Hardware Co., Seattle.

Welding Equipment Stocks Report Eliminated by WPB

Washington

• • • **Having acquired** records indicating the location of most of the used, idle resistance welding equipment available for resale, WPB recently issued an amendment to order L-298 revoking the requirement that owners of such material report their stocks to WPB.

The amended order continues the provision that each manufacturer shall file by the 15th of each month an operations report on form WPB-2830.



CONTINENTAL ROLL
& STEEL FOUNDRY COMPANY

Announces That Its Corporate Name
Has Been Changed To

Continental Foundry
& Machine Company

Manufacturers of Carbon and Alloy Steel Castings, Rolls, Rolling Mill Equipment and Special Heavy Machinery ★ 4 Plants located at East Chicago, Indiana, Coraopolis, Pa., and Wheeling, W. Va.

ARMY E NAVY

Continental Foundry & Machine Company

Among the Week's Trade Notes

U. S. Machine Corp., Lebanon, Ind., has appointed Electrol Oil Burner Corp., Seattle, as distributor of Winkler Stokers for certain territories in that vicinity.

●

Caterpillar Tractor Co. announces that Cliff Miller Machinery Co., Omaha, Neb., has been named distributor for Omaha, Nebraska and surrounding territory.

●

Badger Ordnance Works, Baraboo, Wis., which is operated by the Hercules Co., is being enlarged at a cost of $24,000,000. Production of special ammunition in the new plant is expected to begin in about six months.

●

Foundry Equipment Manufacturers Association has moved to larger, more complete quarters in the Engineers Building, Cleveland 14.

●

Lovejoy Tool Co., Inc., Springfield, Vt., has two new sales representatives: Walter F. Greene, 658 Fairfield Avenue, Indianapolis 5, handles the Indianapolis territory and the Don Hall Tool Co., 20 N. Wacker Drive, Room 2223, Chicago, represents the company in the Chicago district.

●

Lithium Co., Newark, has just released a contract for building a new plant. It will be used for making cartridges and small parts for furnaces.

●

Rogers Machine Works, Inc., has moved its offices to 1807 Elmwood Avenue, Buffalo 7.

●

Crosley Corp., Cincinnati, has appointed Schwander Appliance Co. distributor in St. Louis and surrounding territory.

●

Cook Electric Co., Chicago, has formed the MetaLastics division which will handle specialized production of bellows.

●

Portable Lamp & Equipment Co. has moved its offices and plant to 420 Boulevard of the Allies, Pittsburgh 19.

●

A. O. Smith Corp., Milwaukee, has appointed Pacific Metals Co., Ltd., as distributor in California, Nevada and Arizona, for electrodes and welding equipment.

●

Mechanical Engineering Co. has moved its offices to 1133 Railroad Avenue, Rockford, Ill.

●

Monsanto Chemical Co., Indian Orchard, Mass., is reported planning to expand its plastic division at a cost of $8,000,000 to $10,000,000. The company makes plastic materials for use in fabricating articles for war and peace use.

●

Fairbanks Engineering Co., Worcester, is reported planning production of an ejector type deep well pump for rural home and farm. In the past the company has confined itself largely to production of shallow well pumps.

●

A. Finkl & Sons Co., Chicago, has formed a subsidiary company, Finkl Steel Products Corp. of California, to sell and warehouse Finkl die blocks, hot work steels and other products on the Pacific Coast. The new company maintains an office at 900 Santa Fe Avenue, and warehouse at 2116 Bay Street, Los Angeles. R. M. Edinger, formerly of the R.J.M. Co., Los Angeles, is district manager.

●

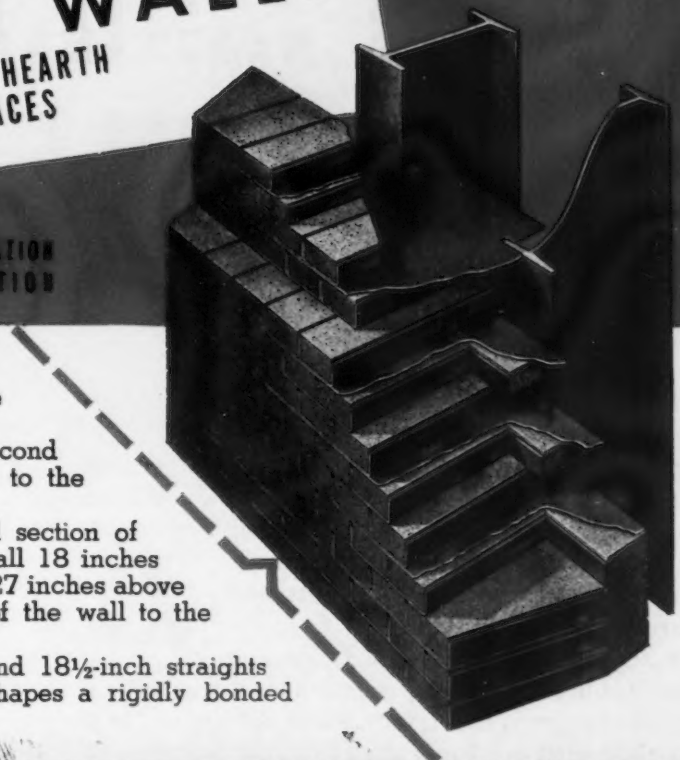
Auto-Ordnance Corp., which maintains factories in Stamford, Greenwich, Bridgeport and New Milford, Conn., has changed its name to Maguire Industries, Inc.

H-W IMPROVED METALKASE

PATENTED AND PRODUCED EXCLUSIVELY BY HARBISON-WALKER

FRONT WALLS
FOR BASIC OPEN-HEARTH STEEL FURNACES

FOR LONGER CONTINUOUS OPERATION AND GREATER TOTAL PRODUCTION



Special Tapered Jamb Brick provide additional clearance for the charging machine.

Steel plates are used at every second course vertically, and are locked to the buckstays.

The illustration shows a typical section of H-W Improved Metalkase front wall 18 inches thick beginning at and extending 27 inches above the door sill level. The balance of the wall to the skew line is 13½ inches thick.

By means of 9-inch, 13½-inch and 18½-inch straights and two special tapered jamb shapes a rigidly bonded construction is attained.

FRONT WALLS—BACK WALLS—END WALLS—SKEWBACKS—ROOF SHOULDERS

In open-hearth front walls, H-W Improved Metalkase are giving from five to ten times the life of silica and as much as twice the life of other basic refractories.

In open-hearth back walls, H-W Improved Metalkase are repeatedly demonstrating their superiority over other basic brick — and are giving many times the life of silica brick.

In open-hearth end walls, H-W Improved Metalkase give two and even three complete furnace campaigns.

The use of H-W Improved Metalkase Skewbacks and of narrow shoulders of H-W Improved Metalkase at both front and back walls not only increases the life of the roofs but also results in much longer life of front and back walls.

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Latest Installment Of Seized Patents

• • • Here's another list of seized patents available on license from the U. S. Alien Property Custodian. This is the 24th installment in a series which started in this magazine last Nov. 4. The number in parentheses at start of each item is its sub-class number.

This series began in the Nov. 4 issue of THE IRON AGE, page 95, at which time procedures for obtaining the patents for use were described with information concerning their usage and possibilities. Seized patent applications were shown in THE IRON AGE on July 8.

Class 83—Mills (Continued)

(8) **1,697,750.** Grinding mill which comprises a stationary and a rotary grinding member, one of which is moved in axial direction relatively to the other one if the mill is overloaded. S. Bjerre, Denmark. 1-1-29.

(9) **1,614,364.** Combined drying and grinding machine for clay and other plastic materials. G. Hidoux, France. 1-11-27.

(9) **1,679,241.** Grinding and mixing apparatus serving for the preparation of mortar of any composition and comprising a horizontal cylindrical jacket, the inner face of which, or part of it, cooperates with cone shaped or cylindrical suitably, profiled rollers which are controlled by a driving shaft. M. David, Belgium. 7-31-28.

(9) **1,859,499.** Ball mill or crusher for pulverizing materials such as coal, cement, fertilizers, etc., of the type in which a current of air or another gaseous fluid carries along the pulverized material towards an outlet orifice placed above the balls. J. Deschamps, France. 5-24-32.

(9) **2,143,732.** Grinding body for crusher tubes and similar apparatus. H. Gerneile, France. 1-10-39.

(10) **2,090,449.** Arrangement for securing of the bowl liner of cone crushers. J. Knudtzen, Norway. 8-17-37.

(11) **1,656,862.** Pulverizing apparatus for solid fuels and the feeding of the said fuel into any furnace in mixture with the quantity of air which is suitable for insuring its complete combustion. G. Loy, France. 1-17-28.

(11) **1,773,906.** Grinding and centrifugal drying mill in which the grist is ground between fixed grinding rings, rotating beating members and by friction of portions of the grist against each other. J. Klagsbrunn, Austria. 8-26-30.

(11) **1,774,487.** Process of and self-regulating plant for the mechanical preparation of pulverized solid fuels and like materials. G. Loy, France. 8-26-30.

(11) **1,812,799.** Means for the mechanical preparation of pulverized solid materials. M. Madore, France. 6-30-31.

(11) **1,881,013.** Supplying device for coal pulverizers comprising a coal conveyor arranged to discharge into a pulverizer through a hinged inspection door by which it is carried and driven by gear which includes toothed wheels one whereof is coaxial with the hinge axis of the door and consequently always in mesh with its companion so that the train is not interfered with when opening and closing the door. W. Woodeson, England, assignor to Societe Anonyme; Fours & Appareils Stein, of Paris, France.

(11) **1,908,724.** Hammer pulverizer wherein the securing of the blades or vanes of the crusher on the disk of the rotor, which is adapted to allow of giving to this disk a very reduced thickness, whilst providing a strong assembly, the elements of which can be easily designed in function of the stresses to which they are subjected. J. Aube, France. 5-16-33.

(11) **1,963,204.** Grinding machine for all kinds of materials whereby the pockets in which the material is being disintegrated are distributed uniformly on the whole periphery of every working chamber and both the ground material and the air sucked in are led out in the axial direction uniformly on the whole periphery of the chamber into a separate sifting chamber which can be fitted with annular sieves. E. Kutaszewicz, Poland. 6-19-34.

(11) **2,171,463.** Hammer crusher with adjustable resilient feed grate. L. Tschauner, Czechoslovakia. 8-29-39.

(11) **2,270,143.** Grinding and separating mill comprising rotating grinding roller with

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mounted beating hammers, a centrifugal separating wheel elevated with respect to said roller, and a casing for said roller and said wheel. A. Schaich, Germany. 1-13-42.

(11) 1,691,210. Grinding and pulverizing mill wherein the breaking and grinding of the softest or the hardest materials can be performed effectively at the same time. B. Scherbaum, Germany. 11-13-28.

(11) 1,702,333. Means for simultaneous drying and grinding of materials by subjecting the materials to the action of a hot drying fluid, sifting the dried materials, grinding the coarse materials obtained in the shifting, and re-drying and re-sifting the ground materials together with the fresh materials. E. Barthelmess, Germany. 2-19-29.

(11) 1,773,228. Grinding and separating mill provided with means for blasting the ground material from a hammer mill against one or more separating surfaces by means of a current of compressed air which is generated by the mill itself in such a manner that the ground material is separated immediately after the grinding process. E. Jungels, Germany. 8-19-30.

(11) 1,793,096. Beetling mill with closed casing and beetling members adapted to revolve therein. E. Kramer, Germany. 2-17-31.

(11) 1,793,097. Bar-shaped beetle for use in beetling mills having its operating face subdivided into separate ledges substantially vertically disposed to the plane of rotation and each provided with shoulders for deflecting the particles of the material to be disintegrated. E. Kramer, Germany. 2-17-31.

(11) 1,814,559. Beetling mill with closed casing from which the ground material is discharged by means of an air current produced outside of said casing. E. Kramer, Germany. 7-14-31.

(11) 1,820,462. Grinding and centrifugal drying mill comprising a casing having a feed hopper, fixed grinding rings in the side of the casing next the hopper, a revoluble disk having beaters arranged to pass between the fixed grinding rings, and a beating rim on said disk and opposed to one of said fixed grinding rings, said beating rim having teeth on its opposed surface. P. Kittay, Austria. 8-25-31.

(11) 1,885,251. Crushing and grinding machine of the rotary, high speed type for powderizing a variety of chemical and other materials and proved with provisions for separating the lubrication arrangement entirely from the grinding chamber. O. Gaiser, Germany. 11-1-32.

(11) 2,171,100. Impulse type rotary crusher for obtaining fine powders. H. Sakurai, Japan. 8-29-39.

(11) 2,270,143. Grinding and separating mill comprising a rotating grinding roller with mounted beating hammers, a centrifugal separating wheel elevated with respect to said roller, a casing for said roller and wheel. A. Schaich, Germany. 1-13-42.

(12) 1,730,906. Roller mill for reducing hard substances like ores, minerals and the like into fine particles comprising a set of crushing rolls of which one is yieldingly mounted on the frame of the mill and is resiliently held in its operative position. A. Voegel, Germany. 10-8-29.

(12) 1,831,696. Roller mill comprising a series of rolls traversed in succession by the material under treatment, the rolls revolving at different speeds, increasing from roll to roll, and the material under treatment being supplied to the gap between the first and second rolls, and the finished material being removed from the last roll by means of a scraper. K. Wiemer, Germany. 11-10-31.

(12) 2,106,869. Drier for granular and like materials comprising a substantially vertical drying chamber or shaft through which the hot gas current for drying passes downwards, while the material to be dried is injected upwards into the shaft so that the grains or particles of material travel upwards in the shafter under their own momentum against gravity. E. Falkenstein and E. Barthelmess, Germany. 2-1-38.

(12) 2,130,983. Grinding mill for use in grinding generally fluid material possessing undesirable volatile constituents and consists of a grinding mill having a plurality of rolls forming a succession of grinding pairs through which the material is passed in series with collecting chambers for the material interposed between each grinding stage. W. Kohler, Germany. 9-20-38.

(12) 2,143,498. Apparatus for controlling the pressure of the rollers of comminuting apparatus, rolling mills, and the like. J. Reichert, Germany. 1-10-39.

(13) 1,692,162. Wall coffee mill for two different grinding materials comprising a separate collecting chamber and a separate grinding mechanism for each kind of material, the grinding mechanisms being mounted on

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a common axle. O. Exsternbrink, Germany. 11-20-28.

(13) 1,614,358. Sink, for kitchen use, in which the voluminous bodies which may be contained in the kitchen rubbish or refuse are reduced in size. P. Gandillon, France. 1-11-27.

(13) 1,835,730. Rotating drying apparatus consisting of means for introducing the paste to be dried into the apparatus, for heating this paste and for adjusting the axial position of the rotating parts. J. Vernay, France. 12-8-31.

(14) 1,787,180. Mill for grinding paints, inks, enamels and other viscous materials consisting of a mechanism for imparting a reciprocating movement to the grinding block and a mechanism for lifting the feed hopper together with the grinding block and its actuating mechanism. E. Todd, Belgium. 12-30-30.

(14) 2,225,797. Colloidal mill in which the grinding or dispersing action is produced by a very high rate of vibration or oscillation up to that ultra sound waves, this amounting to the discovery of an entirely new principle of colloid milling. H. Plauson, Germany. 12-24-40.

(18) 2,045,058. Electrically driven grinding mill in which the grinding element and its driving element are reciprocatory and driven by an alternating electromagnetic field, the grinding and driving elements being resiliently mounted and having an oscillatory frequency substantially similar to that of the alternating electromagnetic field. N. Stern, Germany. 6-23-36.

(22) 1,840,827. Device for grinding pulpy semifluid materials and mixtures such as paints and pharmaceutical products and consists therein that the pulpy semifluid mass to be minced in the grinding device does not flow to the grinding surfaces under the influence of its own weight but that it is supplied to the said grinding surfaces while pressure is applied. K. Albert, Austria. 1-12-32.

(22) 1,923,013. Apparatus for the preparation of semicolloids and uniform colloids by the provision of a plurality of cog wheels adjacent to a toothed breaking-up surface so that the liquid and the material to be disintegrated are thrown by centrifugal action against the latter and ground by the former. H. Plauson, Germany. 8-15-33.

(22) 1,925,069. Grinding mill which grinds the material in a more or less moist state, varying from a paste to a fairly fluid form and is applicable to the fine grinding of paints and the like and employs a cooperating roller pair for carrying out a first stage reduction and has a grinding block cooperating with one of the rollers of the pair to carry out a second stage reduction or a fine grinding stage. W. Kohler, Germany. 8-29-33.

(22) 1,926,907. Single-roll mill for paint and the like wherein the admission hopper is made oscillatable by itself, that is to say, without the grinding block, and similarly the grinding block is oscillatably pivoted to the machine frame by itself, that is to say, separately from the admission hopper. M. Lehmann and E. Grundler, Germany. 9-12-33.

(30) 2,166,652. Machine for working or disintegrating materials of all kinds, especially for husking grains. L. Zinsser, Germany. 7-18-39.

(30) 1,623,701. Feeding and discharging apparatus for machines for material treatment having an arrangement which carries out the dual operation of feeding and expelling the material into and out of the machine with the smallest possible disturbance to the speed thereof. J. Prokop, Czechoslovakia. 4-5-27.

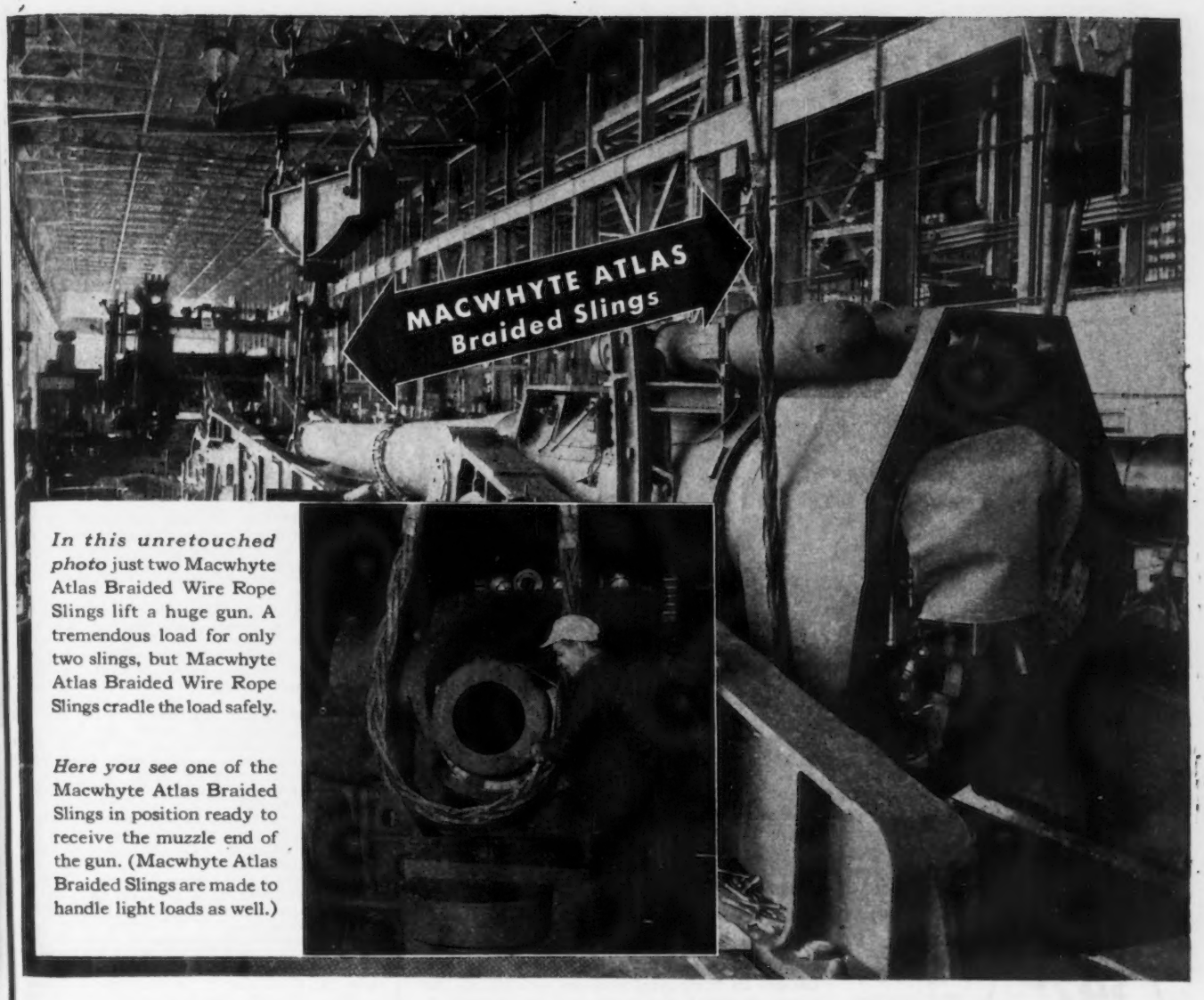
(45) 1,733,417. Pulverizing mill for pulverizing materials of various kinds, in which the material pulverized to the desired degree of fineness is immediately separated from the coarse material by means of a current of air. E. Loesche, Germany. 10-29-29.

(45) 1,832,403. Grinding mill comprising a rotary container in the form of a shallow bowl or dish adapted to receive the material to be ground, rollers or balls pressed on the surface of the said container and adapted to crush the material and a blower for producing a current of air adapted to separate the fine particles from the coarse particles. E. Loesche, Germany. 11-17-31.

(45) 1,636,360. Grinding mill for handling more or less fine material and involving a rotating grinding member having an outer or peripheral surface or edge for grinding purposes. J. Gernelle-Danloy, France. 7-19-27.

(45) 1,879,897. Grinding and mixing apparatus comprising one or more superposed rotatable vessels, or a plurality of rotatable disks, in the superposed and combined position, mounted on a vertical shaft which is rotated by gearing. J. Gernelle-Danloy, France. 9-27-32.

(45) 1,838,998. Crushing mill for crushing coal or similar material comprising a rotary



In this unretouched photo just two Macwhyte Atlas Braided Wire Rope Slings lift a huge gun. A tremendous load for only two slings, but Macwhyte Atlas Braided Wire Rope Slings cradle the load safely.

Here you see one of the Macwhyte Atlas Braided Slings in position ready to receive the muzzle end of the gun. (Macwhyte Atlas Braided Slings are made to handle light loads as well.)

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When larger cranes are built, Macwhyte ATLAS Braided Wire Rope Slings will be made to meet their capacity

dish or table and rollers bearing thereon. E. Loesche, Germany. 12-29-31.

(45) 1,933,473. Kneading, grinding and mixing machine of the kind in which a rotary pan is used, having a central discharge aperture, with mixing operations supported above the floor of the pan around the central aperture, and with a stationary dam extending across the pan from the central aperture to the rim of the pan. L. Eirich and J. Eirich, Germany. 10-31-33.

(45) 2,031,149. Edge runner-like mixing and kneading machine with rotating grinding path. L. Eirich and J. Eirich, Germany. 2-18-36.

(45) 2,110,504. Edge runner mixing and kneading machine with a rotating mixing plate comprising in combination a rotary, partly solid, and partly perforated grinding plate having a discharge aperture. J. Eirich, Germany. 3-8-38.

(46) 1,647,249. Process and device for the rounding of metallic powder particles comprising a casing for holding a mass of particles, rotative means in said casing for forcing said particles to rub and press against each other and rotative means for positively pushing said particles repeatedly through the mass while being pressed and rubbed. E. Podszus, Germany. 11-1-27.

(46) 1,703,634. Process for producing fine powders particularly metallic powders by causing particles of the substance to be pulverized to repeatedly collide with each other because of the action of fluid eddies. E. Podszus, Germany. 2-26-29.

(46) 1,874,150. Means for classifying materials in jet impact pulverizer of the kind wherein the materials are thrown by an air or steam jet against an impact member and then blown upwards by the air current through a surrounding casing. P. Anger, Germany. 8-30-32.

(46) 1,971,092. Jet impact pulverizer of the kind comprising a funnel, the lower end of which is formed into a jet nozzle which communicates with an air supply pipe, materials fed into the funnel being thrown by the air jet against an impact member. P. Anger, Germany. 8-21-34.

(46) 2,072,492. Jet impact pulverizer wherein the pulverizer is built direct into the bunker in which the raw materials are stored, so that the bunker will serve as the pulverizing vessel. P. Anger, Germany. 3-2-37.

(52) 1,700,266. Coal breaker for breaking coal, coke and similar materials whereby the driving mechanism will be thrown out of operation automatically consequent upon the introduction of unbreakable bodies such as stone, iron and the like, into the machine with the coal. A. Lozai and A. Lerciu, France. 1-29-29.

(53) 1,771,505. Stone crusher with an eccentric drive for the movable crushing jaw. A. Muller, Germany. 7-29-30.

(53) 2,049,818. Power driven jaw crusher having a movable or rocking jaw and a

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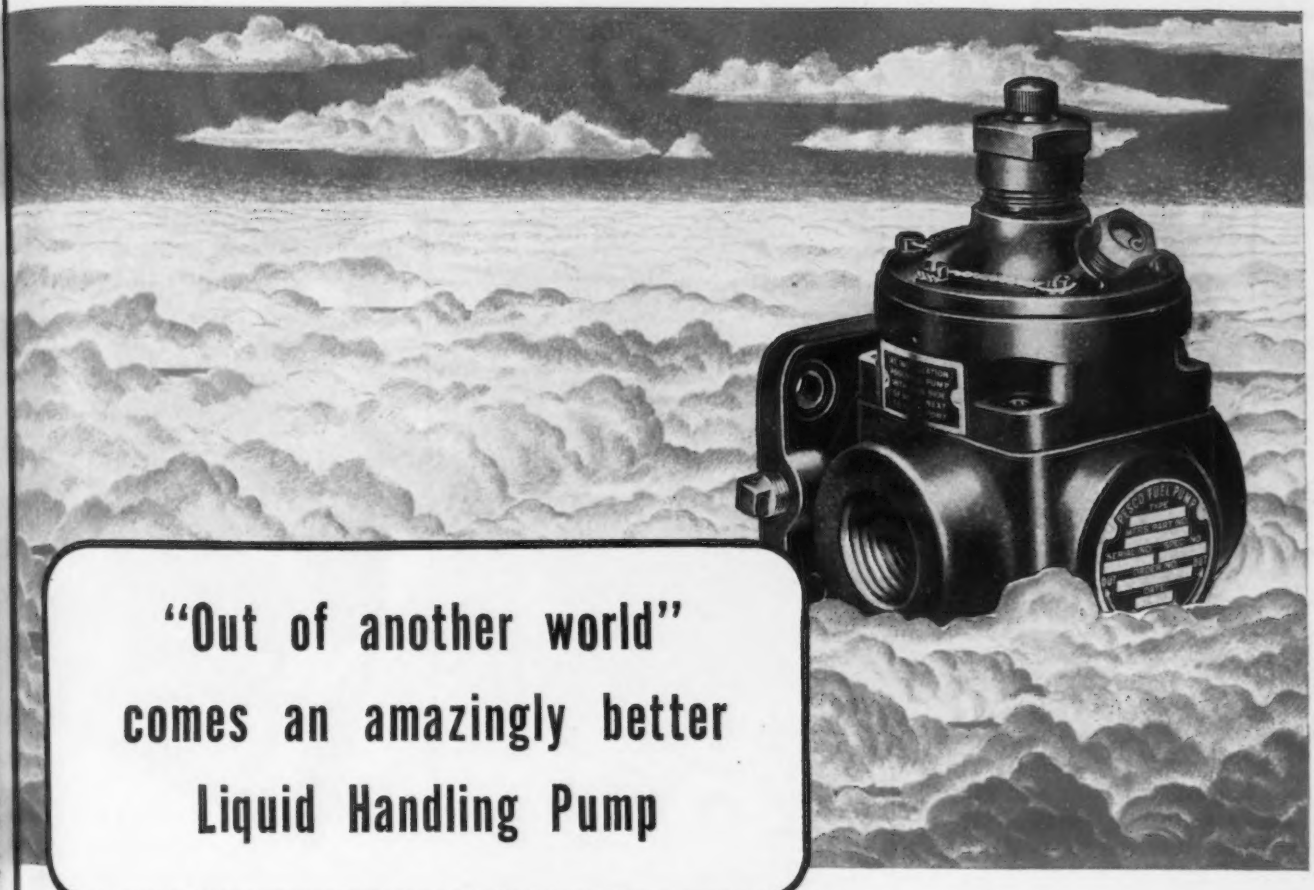
HOLLYWOOD WELDER: *Claudette Colbert, in the picture "Since You Went Away," becomes a shipyard welder. G. L. Revell, welding engineer for Lincoln Electric Co., is Miss Colbert's teacher and plays the part of the welding instructor in the picture.*



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To look at it you wouldn't see much to "ah-h" about.

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PERFORMANCE POINTS TO Pesco FIRST

non-movable or stationary jaw between which the material under treatment is crushed. K. Meister, Germany. 8-4-36.

(53) 2,123,017. Jaw breaker having jaws which lie one over the other and forming an obliquely extending breaking gap, the arrangement being such that the lower jaw alone, or both jaws are adapted to be moved. K. Meister, Germany. 7-5-38.

(53) 2,130,673. Crusher having a movable or rocking jaw and a non-movable or stationary jaw between which the material under treatment is crushed whereupon the material leaves the crusher through a discharge gap at the lower end of the said jaws. K. Meister, Germany. 9-20-38.

(53) 2,264,915. Jaw crusher working on the "concussion" principle, namely, having an obliquely disposed breaking gap formed by a steeply inclined stationary jaw, which is arranged beneath the former and is reciprocated by an eccentric at an unusually high working speed. K. Meister, Germany. 12-2-41.

(57) 1,617,379. Lifting mechanism for stampers in stamping mills. C. Dorn, Germany. 2-15-27.

(57) 1,688,548. Bronze-stamping mill wherein the raw material is supplied to the lower part of the stamper pot and pushed under the material that is already in the stamper pot. A. Lebrecht, Germany. 10-23-28.

(75) 1,647,682. Magazine grinder of the kind which comprises, located above the rotating grindstone, a magazine having adjacent the grindstone continually moving feeding mechanism such as feeding chains or feeding rollers for feeding the woodlogs towards the grinding surface. O. Andresen, Norway. 11-1-27.

(91) 1,627,982. Method and means for the treatment of slags by fluids under pressure. M. Maguet, France. 5-10-27.

(91) 1,699,575. Method of granulating molten slag bringing the molten slag into contact with water so as to convert it into a spongy mass, and exposing said spongy mass to the action of a relatively cool gas stream so as to change it into substantially dry, granulated material. F. Spies, Netherlands. 1-22-29.

(91) 1,705,214. Apparatus for spraying molten substances, particularly metals such as aluminium and zinc, of the type comprising a container fitted with a nozzle through which the molten substance is ejected by air or gas under pressure. H. Versteeg, Netherlands. 3-12-29.

(91) 1,758,878. Apparatus for spraying molten substances, particularly metals such as aluminium and zinc, of the type comprising a container fitted with a nozzle through which the molten substance is ejected by air or gas under pressure, the spraying being effected by air or gas jets surround the nozzle. H. Versteeg, Netherlands. 5-13-30.

(91) 2,271,264. Process for the conversion of metals and metal alloys in finely divided form for the manufacture of dental amalgams. E. Kaufmann and W. Truthe, Germany. 1-27-42.

(91) 2,294,588. Method of and apparatus for producing glass fibers. G. von Pazsiczky, Germany. 9-1-42.

(91) 1,638,669. Method of obtaining solidified granules or pearls from liquids, by causing the liquids in the form of drops to fall on to a cooling surface adapted to travel underneath the point of discharge at a rate corresponding to that of the discharge of the liquid, the granules or pearls being removed from the cooling surface when sufficiently solidified. W. Wachtel, Germany. 8-9-27.

(91) 1,671,683. Method and device for producing finely-granulated bodies from molten metal. E. Podszus, Germany. 5-29-28.

(91) 1,782,038. Conversion of salts and more especially fertilizers and the like into globular or similar shaped bodies. B. Haak, Germany. 11-18-30.

(91) 1,888,394. Apparatus for obtaining a highly porous, cellular, light material from blast furnace slag. C. Schol, Germany. 11-22-32.

(91) 1,888,943. Proceeding and arrangement for making of foamy dry dross. L. von Reiche and J. Giersbach, Germany. 11-22-32.

(91) 1,744,884. Method and machine for the production of solid glue and gelatin in drop or lens shape. C. Greiner, Germany. 1-28-30.

(91) 1,843,716. Apparatus for transforming molten matter such as slag into frothy porous matter. T. Giller, Germany. 2-2-32.

(91) 1,939,138. Apparatus for treating liquid furnace material. C. Schol, Germany. 12-12-33.

(91) 2,136,208. Process for converting liquid pitch into a fragmentary, transportable form. K. Fehr, E. Heinemann, and W. Schneider, Germany. 11-8-38.

(91) 2,234,521. Method and apparatus for producing glass filaments. A. Dietzel, Germany. 3-11-41.

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The Clipper's secret was proper control of air. Schrader equipment and controls give compressed air *power* versatility in industry that urges you to look at air *power* in a new light.

New economy, for example. Schrader Air Ejection Sets apply the principle of controlled, intermittent blasts instead of wasteful constant flow. This saves you air and money.

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TIP TOE CONTROLS—free hands for guiding or feeding work. Eliminates foot fatigue.

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QUICK-ACTING AIR COUPLERS—with "safety twist"

Power Press and Kick Press Controls Complete, eliminate operator fatigue and incorporate safety features. Also Air System Accessories (check valves, rotating joints, speed control valves, air strainers, 4-way valves and cylinders), Hydraulic Gauges, Air Hose, Hose Ferrules and Tools.

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CONTROLS THE AIR

ARMY E NAVY

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Incorporated,* **BROOKLYN, NEW YORK**

Sheffield Makes Iron

Houston, Tex.

The first cast of pig iron from its new modern blast furnace here was made at 11:55 P. M., April 13 by Sheffield Steel Corp. of Texas. Texas ores and limestone, were used, with coke made from Oklahoma coal. Other units, including the open-hearths and plate mill, have been operating for some time and the blooming mill, the last of the DPC additions, is expected to go into operation about May 1.

Committee Formed for Casting Cost Control Study

• • • Appointment of comptrollers or auditors of seven steel castings companies to serve as a standing subcommittee on costs of the Steel Castings Industry Advisory Committee was announced by OPA. They will advise OPA and members of the general industry advisory committee on matters connected with a proposed cost study covering industrial castings. No investigation of costs on wartime work, such as armor, navy and maritime castings, and ordnance, is contemplated at this time, it was said. Members of the subcommittee are:

Harry McClees, Crucible Steel Casting Co., Lansdowne, Pa.; Clarence A. Porter, Sawbrook Steel Castings Co., Lockland, Ohio; George Alston, General Steel Casting Corp., Eddystone, Pa.; J. L. Daugherty, Union Steel Casting Co., Pittsburgh; H. L. Holtz, Sivyer Steel Casting Co., Milwaukee; August C. Christiansen, Pratt and Letchworth Co., Inc., Buffalo, and George W. Sanlen, Caldwell Foundry and Machine Co., Birmingham, Ala.

•

Advisory Committee Formed By Small Arms Manufacturers

• • • The Office of Industry Advisory Committees, WPB, announced April 8 the formation of the Small Arms Industry Advisory Committee. S. Howard Evans, government division, is government presiding officer. Membership is as follows:

C. Francis Cowdrey, Jr., Harrington & Richardson Arms Co., Worcester; Leonard C. Davis, Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.; W. G. Davis, Remington Arms Co., Inc., Bridgeport, Conn.; George L. Dawson, Western Cartridge Co., East Alton, Ill.; S. J. Gilles, Hunter Arms Co., Inc., Fulton, N. Y.; Harry E. Howland, Ithaca Gun Co., Ithaca, N. Y.; Roger Kenna, The Marlin Firearms Co., New York; Walter L. Pierson, O. F. Mossberg & Sons, Inc., New Haven, Conn.; Albert W. Schenck, J. Stevens Arms Co., Division of Savage Arms Corp., Chicopee Falls, Mass.; Gordon Swebilius, Hi-Standard Mfg. Co., New Haven, Conn.; and Harold Wesson, Smith & Wesson, Inc., Springfield, Mass.

BOHN

WITH the changes foreseen in the world of tomorrow, the modern ship will also undergo a complete transformation. Light alloys have been responsible for so many wonders, no one can foresee the wide uses for which these alloys may be used. In every branch of engineering and fabricating of light alloys, the Bohn organization is a prime source. In the vast Bohn plants, aluminum, magnesium and brass products are designed and processed by a group of experts who have spent a lifetime specializing on this group of essential metals. For the last word in light alloys and their proper application, remember the name Bohn.

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GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT, MICHIGAN

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ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

Railroad Scrap Steel Prices Protested

Jersey City, N. J.

• • • **In a formal** complaint to OPA, Central Railroad of New Jersey protested basing point changes that require the Jersey Central to charge only $18.16 a gross ton for No. 1 railroad heavy melting steel scrap at Bethlehem, Pa., although it had been receiving $19.75 a ton at that point since May 7, 1941, when price regulations on scrap were instituted.

The new base price, it was charged, discriminates against the Jersey Central and other railroads that do not happen to run to the newly-established basing points. Other lines believed similarly affected include the New Haven; Boston and Maine; Delaware and Hudson; Maine Central; New York, Ontario, and Western; New York Susquehanna and Western; Bangor and Aroostook; Denver and Rio Grande; Denver and Salt Lake; and the Florida East Coast.

If railroads do not run to one of the basing point cities, under the new plan the freight paid to another railroad if the scrap were transported to a basing point must be deducted from the old selling price, even though the scrap is sold, delivered, and used along its line.

This "artificial allowance" required Jersey Central to charge only $18.16 a ton for scrap delivered on its own line at Bethlehem, but Reading can continue to charge $19.75 there for the same scrap because it happens to run into Philadelphia, which is a basing point, and the Lehigh Valley can sell at Bethlehem for $20.25 a ton because it runs to Buffalo, where $20.25 is the basing point price. Non-railroad scrap can be sold at Bethlehem for $18.25 or more than Jersey Central can charge for superior scrap.

Jersey officials claimed that there would be no objection to paying actual freight for scrap sold off the line, but objection is raised to selling the scrap at a point on the line to a purchaser who has been paying $19.75 under previous regulation and who is still willing to pay it.

Tool and Gage Salvage Manual Issued

Hartford

• • • **An innovation** in tool and gage salvage manuals is the one prepared by the Hartford Chapter of the American Society of Tool Engineers under the direction of George A. Highberg and Frederic L. Woodcock. Besides summarizing in concise manner many of the salvage methods which have already been described in THE IRON AGE and other industrial publications, the Hartford Manual brings to light many new kinks and angles. Not the least valuable portion of the 72-page booklet is the frank comment as to the relative merits of comparable processes.

The first two chapters are directed to the tool designer, illustrating how materials can be conserved by designing composite tools and by keeping in mind how the tool can be utilized later in making some other tool when it is worn out. Salvage methods include brazing of H.S.S. tips, welding and brazing of broken cutters, building up worn tools and gages by chromium plating, and salvage by regrinding with resenoid bonded wheels. Methods of increasing gage and tool life are suggested and the editors take a glance into the future, predicting among other things the use of the precision casting technique for making H.S.S. tools directly from scrap. The manual is being distributed through the American Society of Tool Engineers, Inc., 2567 W. Grand Boulevard, Detroit 8, at 75c. a copy.

Crane and Shovel Shipments

Year and Quarter	Crawler Mounted	Truck Mounted	Total
SHIPMENTS			
1937—Total	2974	312	3286
1938—Total	2260	213	2473
1939—Total	2503	243	2746
1940—Total	3216	378	3594
1941—Total	4191	835	5026
1943—Total	5291	1937	7218
1943—1st	1167	370	1537
2nd	1238	485	1723
3rd	1431	497	1928
4th	1455	575	2030
UNFILLED ORDERS			
1943—Dec. 31	5486	2477	7963

War Department And DPC Contracts

Washington

• • • **Defense Plant Corp.,** RFC subsidiary, has authorized the following contracts:

United States Rubber Co., New York, to provide plant facilities at Scottsville, Va., at a cost in excess of $2,240,000.

Goodyear Decatur Mills, Decatur, Ala., to provide plant facilities at Decatur at a cost in excess of $1,250,000.

Koppers Co., Baltimore, to provide additional equipment at a plant in Baltimore at a cost in excess of $185,000, making a total commitment of more than $5,000,000.

Pratt & Whitney Aircraft Corp. of Missouri, to provide additional equipment at a plant in Kansas City, Mo., at a cost in excess of $700,000, making a total commitment of more than $79,000,000.

General Electric Co., Schenectady, N. Y., to provide additional equipment at a plant in Everett, Mass., at a cost in excess of $600,000, making a total commitment of more than $8,500,000.

Gifford Mfg. Co., Boston, to provide additional equipment at a plant in Waltham, Mass., at a cost in excess of $65,000, making a total commitment of more than $1,880,000.

The Ferro Machine & Foundry Co., Cleveland, to provide equipment at a plant in Cleveland, at a cost in excess of $400,000.

Crown Can Co., Philadelphia, to provide additional equipment at a plant in Philadelphia, at a cost in excess of $100,000, making a total commitment of more than $500,000.

Jones & Lamson Machine Co., Springfield, Vt., to provide equipment at a plant in Springfield at a cost in excess of $385,000.

Plymouth Rubber Co., Inc., Canton, Mass., to provide additional plant facilities at Canton at a cost in excess of $90,000, making a total commitment of more than $215,000.

National Malleable & Steel Castings Co., Cleveland, to provide additional equipment at a plant in Cicero, Ill., at a cost in excess of $90,000, making a total commitment of more than $980,000.

McDonnel Aircraft Corp., St. Louis, to provide additional equipment at a plant in St. Louis at a cost in excess of $35,000, making a total commitment of more than $675,000.

P-V Engineering Forum, Inc., Philadelphia, to provide machinery and equipment at a plant in Philadelphia at a cost in excess of $45,000.

• • • The War Department announced:

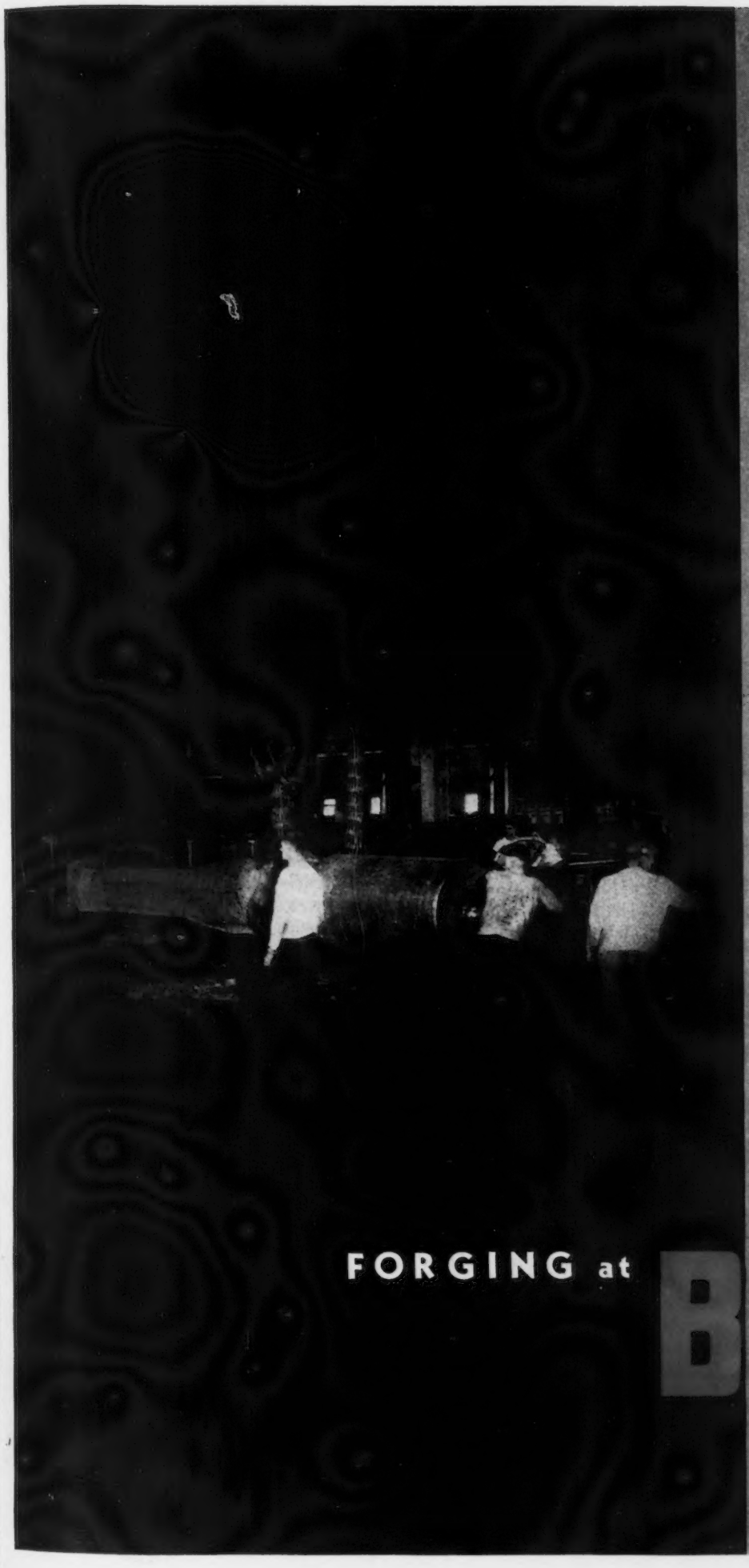
Sunflower Ordnance Works, Eudora, Kan., authorization for construction of additional buildings and utilities in the amount of $2,603,360. Work will be supervised by the Kansas City, Mo., District Office of the Corps of Engineers.

Sacramento Air Depot, Sacramento, Cal., construction of extensions to runways, additional taxiways and drainage systems. The estimated amount of the contract is $1,105,006.50. Contract awarded to A. Teichert & Co., Sacramento. Work will be supervised by the Sacramento District Office of the Corps of Engineers.

Brooklyn Field, Mobile, Ala., construction of runway improvements. The estimated amount of the contract is $777,904.65. Contract awarded to Wright Construction Co., Columbus, Ga. Work will be supervised by the Mobile District Office of the Corps of Engineers.

Army Air Forces Sub-Depot, Memphis—Award of contract to Dunn Construction Co., Inc., and Smartt Paving Co., Millington, Tennessee, for construction of additional warehouses and grading. The estimated amount of the contract is $837,626.94. Work will be supervised by the Mobile, Ala., District Office of the Corps of Engineers.

Car Storage Yard, Newark, Del.—Award of contract to Buffalo Gravel Corp., Camp Hill, Pa., for construction of railroads, roads, earth fill track barricades, drainage facilities and incidental work for 200-car storage yard. The estimated amount of the contract is $883,375. Work will be supervised by the Philadelphia District Office of the Corps of Engineers.



Plan now to use these BARIUM STEEL FACILITIES

The following production services of the Barium Steel Shops are now available for contract work in melting and refining, forging, heat-treating and machining. We welcome particularly work of a difficult nature on which our modern facilities, skilled personnel and *Unified Control* can produce unusually satisfactory results.

Forging Hammers . . . We now have available 1500-ton and 1000-ton forging presses for heavier requirements, and steam forging hammers of up to 12,000 pound capacities for flat die work.

Melting Facilities consist of several open hearth furnaces up to 35 tons in size — now melting and meeting all analyses of carbon and a range of alloy steels to the critical tests of United States Government specifications. We can pour ingot sizes up to 42″ diameter.

Heat-Treating and Annealing furnaces of the most modern type are included in our plant, as well as

Machining Facilities and a well equipped

Chemical and Metallurgical Laboratory

This *Unified Control* is available to you in whole or in part. Please send us your inquiries.

BARIUM
STAINLESS STEEL CORP.
Producers of Carbon, Alloy and Stainless Steel
CANTON · OHIO

Titanium Bearing Graphitized Pig Iron

(CONTINUED FROM PAGE 47)

ing made with regular pig iron shows segregation of graphite into pockets, a flaky structure and shrinkage cavities, while the G-Iron casting shows a uniform dispersion of the graphitic carbon and no segregation.

In a spiral fluidity test made with G-Iron having a composition of 2.08 per cent silicon and 3.56 per cent total carbon, the iron ran 59 in. This compares with the normal fluidity of from 30 to 40 in. for regular iron of approximately the same analysis. This unusual fluidity may be accounted for by the purging of the iron from oxides and silicates which tend to produce sluggish iron.

Because of the absence of segregation and the lower combined carbon, with the finely divided graphitic carbon uniformly distributed, improved machinability is secured despite a slight increase in the Brinell hardness compared with the regular iron castings. Absence of hard spots has also been achieved, with resultant increase in tool life.

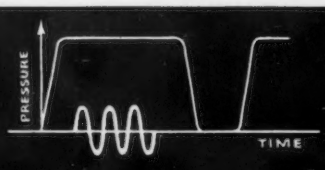
Test bars with a composition of 2.07 per cent silicon, 3.60 per cent total carbon and 0.41 per cent combined carbon showed tensile strengths of 31,500 to 32,000 lb. per sq. in. and transverse strengths of 3300 to 3400 lb. with a 1 in. square bar on 12 in. centers. The foundry producing these castings claims that both tensile and transverse strengths with G-Iron are approximately 10 per cent above those obtained with the use of regular pig iron.

Oxygen Enriched Blast Investigated

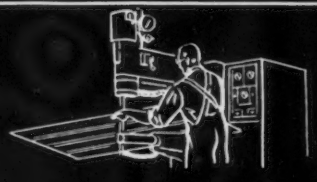
(CONTINUED FROM PAGE 54)

consists of about 12 per cent CO_2 and 30 per cent CO. The thermal value of the coke is only employed in the furnace to the extent of 50 per cent or even less; the remaining portion issues in the throat gas. If the formation of carbon monoxide could be completely suppressed with the employment of oxygen enriched blast, feasibly the coke consumption of blast furnaces could be reduced to half the present figure.

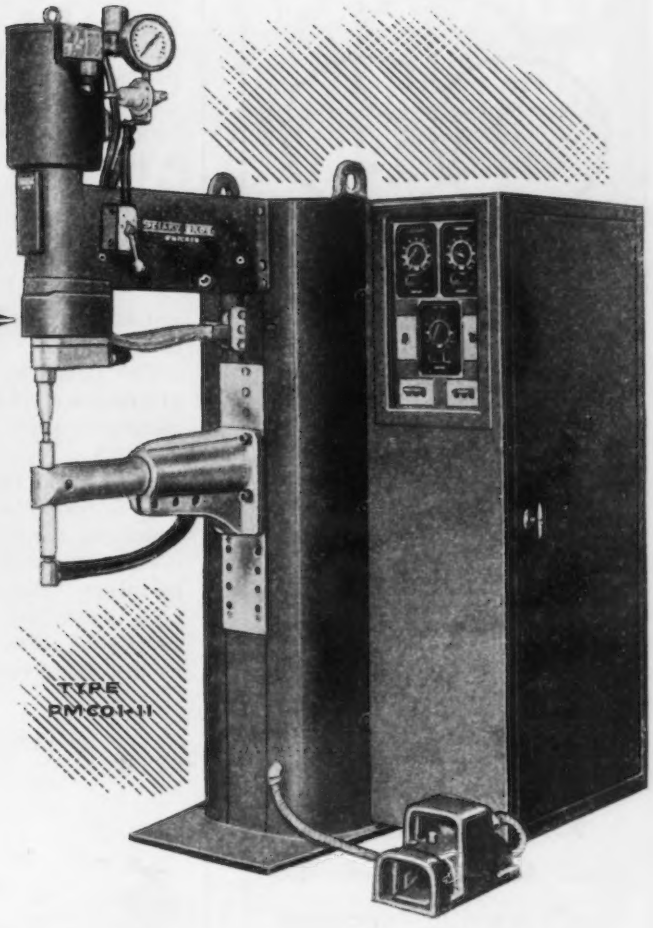
In the present work, enriched blasts of different oxygen contents were investigated in a low-type experimental blast furnace and with different depth of burden. The experiments showed that with ordinary air blast the com-



high welding pressure-precise welding current



200 spot welds per minute



. . . mean high quality, high production welding on light gauge ferrous alloys.

This 60 KVA Sciaky Spot Welder is specifically designed for the high quality welding of stainless steels, mild and zinc-coated steels, monel metals, brass and copper. The high pressure (up to 2600 lbs. psi) and electronic current timing assure high shear values wherever structures are subject to stresses and vibration.

Note these additional exclusive Sciaky features.

SELF-CONTAINED UNIT . . . Electronic controls and ignitron contactor are mounted in a hinged cabinet convenient to operator . . . simplifies installation.

SCIAKY ELECTRONIC TIMER . . . The patented Sciaky Timer uses no intermediate relay, but operates a heavy duty relay direct from the tube.

TRANSFORMER . . . Secondaries are hard rolled copper — having less tendency to overheat than cast.

HEAD RETRACTION . . . Retraction of 2¼" is controlled by foot switch. Short working stroke (½") eliminates tendency of electrodes to hammer.

SCIAKY ELECTRO VALVE . . . Air to the operating cylinder is controlled by a specially designed, fast-acting d.c. operated solenoid valve.

FLEXIBLE BRAIDED CABLES . . . These are used between the transformer and upper electrode and result in less tendency for fatigue breaks.

FOOT SWITCH . . . Stroke on hooded foot switch is ¼"—operator need not raise entire foot from floor.

AUTOMATIC WATER SHUT-OFF . . . Water supply to electrodes is cut off when head is retracted or control switch off—means quicker electrode change.

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bustion may be controlled so that practically only carbon dioxide is produced, while with oxygen enriched blast this goal cannot be attained. On the basis of the experiments, the possibilities of reduction in the low-type furnace is discussed. With air blast in the low-type blast furnace, practically complete combustion to carbon dioxide is possible, but with oxygen enriched blast in the low-type furnace, no practical means for combustion to carbon dioxide are discernible. On the other hand, operating with a high carbon monoxide content, in the latter case, appears to be very advantageous.

Copper in Powder Metallurgy

(CONTINUED FROM PAGE 57)

mendous saving in cost and manufacturing time.

The strength and life of diamond grinding wheels have been greatly increased by replacing the plastic backing with a copper base metal powder backing. The copper base mixture is used to form the inner portion of the wheel and the same mixture, but containing diamond powder, forms the periphery of the wheel.

In the contact field copper is being added to refractory and to noble metals. Such combinations permit the development of properties unattainable by other methods of fabrication.

High conductivity parts requiring extensive machining to manufacture are being replaced by high density copper parts produced from metal powders. These molded parts require little if any machining and considerably decrease manufacturing costs.

Steel-backed copper base bearings are being used extensively in the automotive industry. These bearings have a layer of sintered copper base powder on a steel backing.

o o o

BRITISH ROCKET ACK ACK: *Revolutionizing the British anti-aircraft defenses, these multi-barreled rocket guns have been in action a short time against Luftwaffe raiders. The lower photo shows the complete unit ready for action, while that above shows them being unloaded prior to being set up.*

o o o

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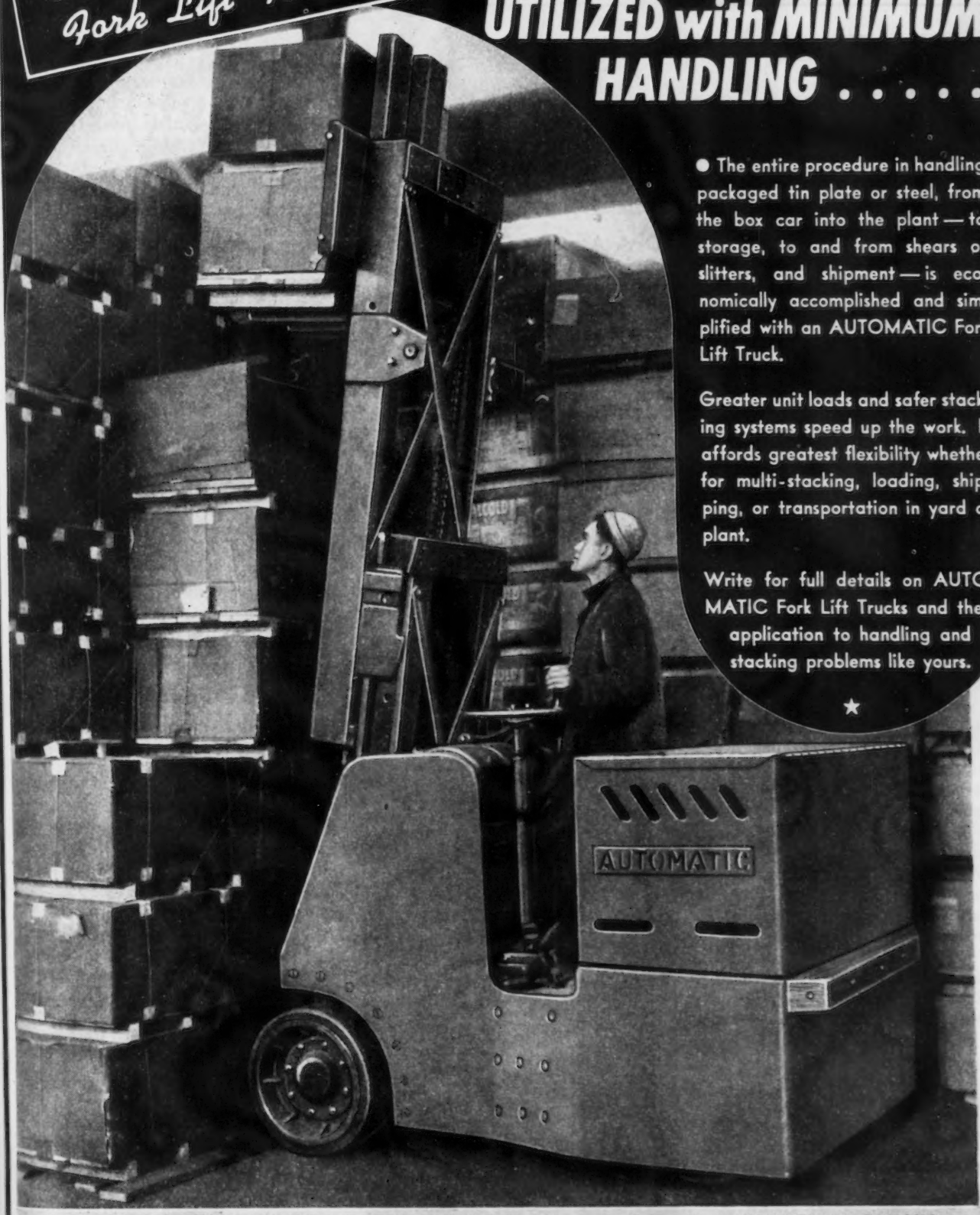
Fork Lift Trucks

OVERHEAD SPACE FULLY UTILIZED with MINIMUM HANDLING . . . . .



● The entire procedure in handling packaged tin plate or steel, from the box car into the plant — to storage, to and from shears or slitters, and shipment — is economically accomplished and simplified with an AUTOMATIC Fork Lift Truck.

Greater unit loads and safer stacking systems speed up the work. It affords greatest flexibility whether for multi-stacking, loading, shipping, or transportation in yard or plant.

Write for full details on AUTOMATIC Fork Lift Trucks and their application to handling and stacking problems like yours.

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MACHINE TOOLS

. . . News and Market Activities

Surplus Control by Industry Urged

Cleveland

• • • **The proposal** that a machine tool industry committee be given the final authority in controlling the re-redistribution of government owned machine tools at the close of the war as put forth in an article by Max Leach of the H. Leach Machinery Co., Providence (THE IRON AGE, April 13, page 56), would seem to have some hopes of realization according to the latest information coming from Washington sources concerning legislation of the problem.

According to the plans set forth by both the United States Chamber of Commerce and the National Association of Manufacturers for redisposition of surplus materials, such an industry board would be possible and now appears likely to be legalized without too much delay.

Both of these nearly identical plans call for the establishment of an overall Surplus Properties Disposal Commission composed entirely of industry representatives with no government men. Behind this commission would be boards from each individual industry composed of members of the industry appointed by that industry.

While the overall governing board would have the powers and authority to demand and utilize the records of surplus properties, it is understood that it would depend solely upon the recommendations of the industry boards to lay the plan which would solve each industry's problem most satisfactorily. Thus, a committee or board composed entirely of machine tool men would have the opportunity to place before the governing board a plan for redistribution of surplus tools which had the industry's endorsement and the governing board would have the powers to implement the plan and see that it was enforced.

At least that is the understanding of the tentative planning that is held here.

Actually no concrete step in this direction has yet been taken by Congress but it has become known that the thinking of the legislators is leaning in the direction of the NAM and C of C plans. One favorable step that has been noted recently was the move which separates contract termination legislation from surplus disposal legislation. A bill is expected to be presented soon in the Senate that will implement the general plan of permitting industry to solve its own problems through a central disposal commission.

OPA Assumes Control of Second-Hand Machine Sales

Washington

• • • **The WPB has** delegated authority to the OPA to require that dealers, agents, auctioneers, brokers, and machinery manufacturers who sell second-hand machines, equipment, and parts file reports as to the available machinery they have on hand.

The form that will be required from used equipment and machinery sellers by OPA in the near future is WPB form 2574, generally known as the used equipment and machinery inventory and sales report form. This form is not as yet available. OPA will implement this delegation of authority with specific rules that will govern filing of reports, and will notify sellers when copies of the report form will be available.

The purpose of this delegation is to consolidate in one agency the right to obtain, on a mandatory basis, specific information regarding availability of second-hand machinery and equipment. The consolidation of this information is necessary for the conduct of WPB redistribution programs. By granting this authority to OPA, it becomes possible for both WPB and OPA to have access to both price and supply information that can be maintained in convenient form. This delegation is contained in WPB Directive No. 35, issued March 24, 1944.

PUMP TESTS: *To simulate actual flying conditions pumps used on P & W engines are placed in a housing which corresponds to their position in the frames of aircraft engines. Then, powered by ¼ hp. Apex washing machine motors, they rotate on a vertical shaft at 1200 r.p.m. The pumps and housings are both sealed to prevent air leakage. Rigid pressure and temperature restrictions are maintained for the 8-hr. test run.*

OPA Price Rules Amended On Second-Hand Machines

Washington

• • • **Several changes** in the regulations establishing maximum prices for sales of second-hand machine tools and extras are announced by the OPA in amendment 4, MPR 1, dated April 19. The new regulations become effective April 25.

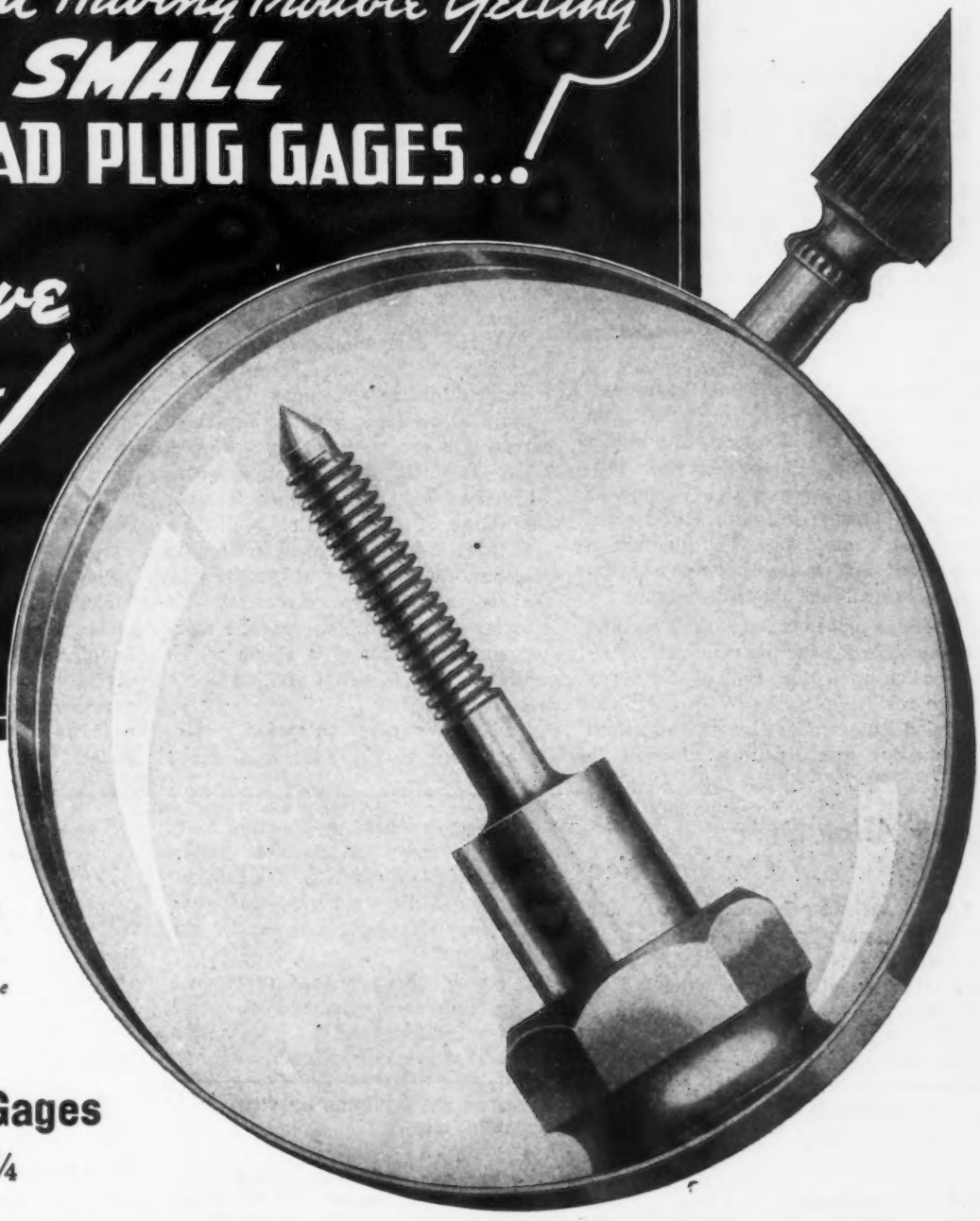
Where the seller can demonstrate that a second hand machine tool or extra was purchased new after March 1, 1941, the actual purchase price may be substituted for the March 1, 1941, price heretofore used as the base price in computing the value for resale. This provision will permit higher acquisition cost to be reflected in the ceiling price of the second-hand machine tool where the manufacturer's price had increased between March 1 and Oct. 1, 1941.

Changes have been made in allowable rental charges, providing for a weekly rental charge at one-quarter of the maximum monthly charge and a daily rental charge of 0.5 per cent of the annual rate, but not less than $5 in any case.

Are You Having Trouble Getting SMALL THREAD PLUG GAGES...?

We have them!

Immediate Delivery from STOCK



SIZES
0-80
to 1½ -6
National Fine
National Coarse

AND
Pipe Plug Gages
⅛ to 1¼

BY specializing in the manufacture of thread plug and ring gages, to the exclusion of all other types, we have built up an exceptionally large stock of standard thread plug gages, especially in the machine screw sizes. Orders and re-orders from the nation's leading armament manufacturers testify to the quality and accuracy of our products. Wire us your orders!

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NON-FERROUS METALS

. . . News and Market Activities

Big Shell Program Upsets Copper Balance

Chicago

• • • **Telescoped requirements** for heavy artillery shell cases are heavily burdening the copper supply-demand relationship, Donald Nelson WPB Chairman, acknowledged last week at a local press conference.

Cutbacks in the small arms ammunition program in the latter part of 1943 knocked copper off the highly critical perch, but the big shell program now is imposing heavy demands upon supplies of the red metal, Nelson said. He eased possible misgivings, however by stating supply and demand were "just about in balance."

Previous declarations that civilian automobile production was out of the question until the fall of Germany were reaffirmed. The WPB chief expanded this policy by stating auto production was dependent upon a 25 to 40 per cent cutback in the overall war effort and that there were no prospects for any reduction until the Nazis topple. The automobile industry, he pointed out, is the nation's biggest employer of labor, and its material and components requirements cut through the entire fabric of the country's business economy.

Queried on reports that the armed services were purchasing through trade channels civilian commodities which had been programmed to meet the wants of John Q Public, Nelson said, "We try to get the services to program their needs," acknowledging that there was some diversion. He referred to a monthly domestic market survey of domestic items which indicated that essential civilian needs were being met.

Lumber, paper, pulpwood, pulp, leather and textiles are considered pressing problems by the WPB, the former Chicagoan declared, and high on the critical components list are bearings, particularly the larger sizes, castings and forgings. The latter components will be hard hit by the "under 26" draft, along with radio, radar, coal mining, and industries requiring a high degree of technical skill. Nelson's attitude conveyed the impression he had made up whatever differences he may have had with the new draft policy, and he even tossed in the old syllogism that "you can't fight a soft war."

Good progress is being made on a definite program for disposition of surplus material, and a clarifying policy may be expected soon, Nelson indicated. As far as making provision for postwar use of war plants he offered the opinion that "the individual communities ought to do some of the thinking about possible postwar uses of their big war factories."

New Alloy Gets Ceiling Price

• • • **A ceiling price of 15c. a lb.** for a new primary grade aluminum alloy ingot, alloy No. 356, was established by OPA recently in amendment 4 to MPR2.

This alloy, OPA said, is comparable with the three aluminum alloy ingots now being produced by blending 50-70 per cent scrap with high purity primary pig—alloys Nos. 142,355 and 195. The ceiling price of this alloy is in line with ceiling prices of the other three.

It is now being produced in response to an increasing demand for this primary grade material. This action becomes effective April 20.

The specifications for Alloy No. 356 are as follows:

	Per Cent
Copper	0.20
Silicon	6.50 to 7.50
Iron	0.40
Magnesium	0.20 to 0.40
Manganese	0.1
Zinc	0.1
Chromium	0.1
Titanium	0.20
Total others	0.1
Each	0.05
Aluminum	Remainder

SUMMARY OF COPPER STATISTICS REPORTED BY MEMBERS OF THE COPPER INSTITUTE, MARCH, 1944

In Net Tons

U. S. Duty Free Copper		Production Crude*	Production Refined	Deliveries to Customers Domestic**	Deliveries to Customers Export	Refined Stocks† End of Period
Year,	1939	836,074	818,289	814,407	134,152	159,485
"	1940	992,293	1,033,710	1,001,886	48,537	142,772
"	1941	1,016,996	1,065,667	1,545,541	307	75,564
"	1942	1,152,344	1,135,708	1,635,236	.....	65,309
"	1943	1,194,732c	1,206,871	1,643,677	.....	52,121
3 mos.,	1944	293,375	279,027	382,394	.....	37,259
July,	1943	100,456	105,589	129,631	.....	55,097
Aug.,	"	97,413	100,077	147,135	.....	53,726
Sept.,	"	98,867	98,333	141,111	.....	45,844
Oct.,	"	102,589	97,274	129,212	.....	47,148
Nov.,	"	99,340	102,136	138,881	.....	52,027
Dec.,	"	98,601c	104,644	115,850	.....	52,121
Jan.,	1944	95,902	92,781	101,779	.....	45,800
Feb.,	"	96,263c	87,128	124,532	.....	36,489
Mar.,	"	101,210	99,118	156,083	.....	37,259

* Mine or smelter production or shipments, and custom intake including scrap.

** Beginning March, 1941, includes deliveries of duty paid foreign copper for domestic consumption.

† At refineries, on consignment and in exchange warehouses, but not including consumers' stocks at their plants or warehouses.

c Corrected.

•

• • • **Production of mercury** in February amounted to 3800 flasks, indicating a drop from the 4400 flasks made in January, according to the Bureau of Mines. It is normal for production in February to be below most other months because of weather handicaps and the shorter work period. The decline in February, 1944, however, was more severe than usual which was attributable, no doubt, to the withdrawal of Metals Reserve buying and to the evident intention of consumers to reduce their inventories because of the easier supply conditions. Consumers and dealers stocks were 3800 flasks lower at the end of February than they were two months earlier.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	12.00
Aluminum, deoxidizing grades	11.00 to 12.25
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	13.00
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$7.50
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	**8.75**
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	**8.50**
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	**7.50**
Old rolled brass	**7.00**
Admiralty condenser tubes	**7.50**
Muntz metal condenser tubes	**7.00**
Plated brass sheet, pipe reflectors	**6.50**
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.375
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

All S-type alloys (except 2S)	8.50
2S solids	8.00
High grade alloys	7.00
Low grade alloys	6.50
Borings and turnings	
High grade alloys	5.50
Low grade alloys	5.00

Plant scrap, mixed

All solids	6.00
Borings and turnings	4.00

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	7.00
Old castings and forgings	6.50
Pistons, free of struts	6.50
Pistons, with struts	4.50
Old alloy sheet	5.50

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size cut to size	22⅞
	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

Mills Tightening Up on Turnings Analyses; Shipment Rejections Increase

New York

• • • Turnings and low phos continue to be the prime headaches of both dealers and consumers, with movement of these grades off sharply. Low phos is having difficulty in finding markets in practically all consuming centers, while turnings are being sold at reduced prices and under rather rigid specifications. One eastern mill is insisting that turnings not exceed 0.25 per cent chromium, 1 per cent nickel, and 0.10 per cent molybdenum. The 1 per cent nickel restriction is the stickler, laying the way open for rather consistent mill rejections.

This business of triple alloy scrap was pretty well hashed out at the recent WPB industry advisory committee meeting of the bolt, nut and rivet manufacturers. WPB officials stated that there must be a switch from single and double alloyed steels in bolt manufacture to triple alloyed steel, such as NE 8730. The volume of triple alloyed scrap coming into the mills, much in an unsegregated condition, has resulted in rejected heats galore. Consequently, to take care of this contaminated scrap, some 60 per cent of the steel requirements for bolts may have to be fulfilled from NE 8730. Bolt manufacturers pointed out several objections and predicted bolt production would drop 30 per cent if such a move was made.

From a price standpoint, turnings have been taking a licking the past few weeks in at least two of the eastern markets. At Buffalo, the price has been knocked down 75c. a ton from the $14.25 level. After successively breaking this price, the consumer that did so found stocks sufficient to drop out of the market. While dealers are inclined to minimize these purchases, new scrap contracts that come up shortly may reflect the weakness in these prices.

Shipments of turnings from northern New Jersey to Sparrows Point are going at Sparrows Point ceiling of $13.75, but the consumer is rigidly holding to rejections of such material sold as carbon steel turnings but containing nickel. From northern New Jersey, dealers must, in addition, absorb about 90c. a ton freight rates to complete these sales into Sparrows Point.

One difficulty encountered in some areas has been the inclusion of turnings in hydraulically compressed bundles, and at least one consumer has warned dealers to discontinue this practice. As hydraulically compressed bundles, No. 1 steel prices are obtained for the turnings thus handled.

•

CHICAGO — High quality shipyard scrap received from the West Coast is proving a boon to mills manufacturing specification steel and indirectly may prove helpful to the local trade in allowing purchase of less desirable grades generated locally. Previously reported price concessions on short shoveling turnings and open hearth grades continue. Mill inventories universally are considered adequate with consequent selective buying.

•

PITTSBURGH — Demand for open hearth and blast furnace grades continues brisk, with plenty of opportunity for brokers and dealers to dispose of all supplies they obtained. There are this week, however, no shortage spots, and demand is in fairly good balance with supply. Low phos is not going begging, but salesmanship is needed at times to dispose of this material.

•

CLEVELAND—A sharper demand for most grades is evidenced here but relatively small quantities are moving. Most inventories are so comfortable that only occasional small lot buying is required. With consumers in a satisfactory position there has been a tendency to buy only when some price concession makes purchases worthwhile. However, no price cutting has appeared recently on a scale sufficiently large to affect the market. Some short shoveling turnings have been bought in Cleveland at as much as $1 off but in small quantities.

•

PHILADELPHIA—One consumer here is insisting that turnings not exceed 0.25 per cent chromium, 1 per cent nickel, and 0.10 per cent molybdenum. Yards don't like that 1 per cent nickel because it lays the way open for the mill to reject shipments.

•

BOSTON—The market on turnings now ranges from $9.06 a ton up to $9.25. In the case of the $9.06 price, it is all the mill will pay regardless of point of shipment. One mill is insisting on a certain analysis. Otherwise the price structure has not changed, and the average yard and broker continues to report business on a hand to mouth basis. The movement of No. 1 steel is almost exclusively confined to shipyard material.

•

BUFFALO—A leading consumer is reported to have succeeded in making the first dent in ceiling prices in this district, obtaining a large quantity of turnings at 25c. per ton below the $14.25 level and also less a 50c. broker allowance. This buyer is reported to be well loaded and out of the market for turnings now, and looking for below ceiling offers on other items. Some dealers are inclined to minimize the extent of these purchases, however. Rejects are reported increasing because of inclusion of alloys in turnings offered as carbon. Low phos is moving readily as are virtually all items except turnings, now a sore spot. The largest consumer in the district has 30 barge loads of scrap, about 18,000 tons, en route from seaboard by canal to arrive May 1. Some of this may be war scrap. This mill also has two boats with 10,000 tons of heavy melting coming from the Midwest.

•

CINCINNATI — The market in the southern Ohio district tends definitely quiet, with the demand a trifle off from the briskness of a month ago. Two of the leading consumers have tended to ease up on their commitments and a general slowing up of interests on low phos scrap has been noted. Of course, some of the picture may be the result of a lack of good scrap being available, since dealers indicate that all consumers are interested in getting good scrap.

Scrap Agency Will Disband

• • • The Wartime Prices and Trade Board of Canada reported that it was planning shortly to close down the Wartime Salvage, Ltd. in Toronto and surrender its charter. Wartime Salvage, Ltd. was organized in 1942 as a fiscal agency cooperating with the Department of Munitions and Supply in handling various types of scrap materials including scrap iron and steel and other metals. It acted as a merchandising agency for the distribution to mills of these products.

Functions of the company subsided with the recent easing of the scrap metal situation and it was decided the agency was no longer needed in Canadian wartime controls. Wartime Salvage, Ltd. is the first of the Crown companies to be discarded, although there has been considerable easing off in various governmental controls, especially with regard to civilian supplies of iron, steel, and other metals.

SCRAP PRICES . . .

Railroad Steel and Cast Scrap Price Schedule

BASING POINT	No. 1 and No. 2 Heavy Melting; Wrought Iron and/or Steel Wheels; No. 2 Steel Wheels; Iron and/or Steel Axles; Uncut Bolster and Side Frames	No. 1 Bushelings; Steel and Iron Arch Bars; Boilers, Fire Boxes, and Tanks; No. 2 Cast Steel; Flues, Tubes, and Pipes; Limed Iron and Steel; Uncut Structural Wrought Iron and/or Steel; Destroyed Cars and Locomotive Tenders	No. 2 Bushelings	No. 1 Turnings	No. 2 Turnings, Drillings, and Borings	Uncut Frogs and Switches	No. 1 Sheet Scrap	No. 2 Sheet Scrap	Scrap Rails, Random Length; Iron Arch Bars, 3 ft. and Under	Rerolling Rails for Rerolling; Uncut Tires; Cut Bolsters and Side Frames; Angles and Splice Bars	Cut Rails, 3 ft. and Under	Cut Rails, 2 ft. and Under	Cut Rails, 18-in. and Under; No. 3 Steel Wheels; Spring Steel; Couples and Knuckles	Cut Tires	Solid Steel Axles For Rerolling or Reforging Use Only. Base Price For Other Uses
						(Dollars	Per Gr	oss Ton)							
Pittsburgh, Canton, Youngstown, Wheeling, Sharon, Steubenville	$21.00	$20.00	$17.50	$19.50	$15.00	$20.50	$16.00	$14.00	$22.00	$23.50	$24.00	$24.25	$24.50	$25.50	$27.00
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	20.50	19.50	17.00	19.00	14.50	20.00	15.50	13.50	21.50	23.00	23.50	23.75	24.00	25.00	26.50
Chicago, Philadelphia, Sparrows Point, Wilmington	19.75	18.75	16.25	18.25	13.75	19.25	14.75	12.75	20.75	22.25	22.75	23.00	23.25	24.25	25.75
Buffalo	20.25	19.25	16.75	18.75	14.25	19.75	15.25	13.25	21.25	22.75	23.25	23.50	23.75	24.75	26.25
Kokomo	19.25	18.25	15.75	17.75	13.25	18.75	14.25	12.25	20.25	21.75	22.25	22.50	22.75	23.75	25.25
Duluth	19.00	18.00	15.50	17.50	13.00	18.50	14.00	12.00	20.00	21.50	22.00	22.25	22.50	23.50	25.00
Detroit	18.85	17.85	15.35	17.35	12.85	18.35	13.85	11.85	19.85	21.35	21.85	22.10	22.35	23.35	24.85
St. Louis	18.50	17.50	15.00	17.00	12.50	18.00	13.50	11.50	19.50	21.00	21.50	21.75	22.00	23.00	24.50
Birmingham, Los Angeles, San Francisco	18.00	17.00	14.50	16.50	12.00	17.50	13.00	11.00	19.00	20.50	21.00	21.25	21.50	22.50	24.00
Kansas City	17.00	16.00	13.50	15.50	11.00	16.50	12.00	10.00	18.00	19.50	20.00	20.25	20.50	21.50	23.00
Seattle	15.00	14.00	11.50	13.50	9.00	14.50	10.00	8.00	16.00	17.50	18.00	18.25	18.50	19.50	21.00

SALES REGULATIONS: On and after March 15, 1944, no operating railroad not operating in a basing point named may sell or offer for sale iron and steel scrap to a consumer or his broker without obtaining prior written approval from OPA unless prior to that date it has filed with OPA a statement in writing setting forth maximum on-line price for No. 1 Railroad Heavy Melting Steel and describing the method used to calculate this price. The statement shall include: The most favorable basing point selected; the price at such basing point; the location of the scrap accumulation point; the lowest established charge for transporting scrap by rail from such accumulation point to the named basing point; and the foreign line proportion of such lowest established charge.

MAXIMUM PRICES: The maximum on-line price of any grade of steel scrap from an operating railroad operating in a basing point shall be the price set for the scrap at the highest priced basing point in which the railroad operates. For an operating railroad not operating in a basing point, the price shall be the price set for the scrap at the most favorable basing point less the foreign line proportion of the lowest charge for transporting scrap by rail from scrap accumulating point of railroad to such basing point. "Scrap accumulation point is that point from which greatest tonnage was shipped in 1943. "Most favorable basing point" that the basing point which will yield the highest maximum on-line price. In no case need the on-line maximum price fall below $15.00 per gross ton for No. 1 Railroad Heavy Melting Steel. The maximum price of any grade of steel scrap originating from a non-operating railroad shall be the price established for the scrap at the most favorable basing point minus the transportation charges for rail, vessel, or motor vehicle shipment or combinations of these, and for established charges shown in OPA Price Schedule No. 4. Where the non-operating railroad is located in a basing point shown above, the following switching charge deductions will be applicable: Chicago—84c.; Pittsburgh—55c.; Detroit—53c.; Cleveland, Los Angeles, San Francisco, Sharon, and Youngstown—42c.; Seattle—38c.; Buffalo—36c.; Birmingham and Kansas City—32c.; Ashland, Canton, Cincinnati, Duluth, Kokomo, Portsmouth, Steubenville, St. Louis, Wheeling, and Wilmington—28c.; Middletown and Philadelphia—14c.; and Sparrows Point—11c.

SCRAP PREPARATION: With the exception of unprepared scrap prepared in-transit, railroad steel scrap prepared by a dealer or moving through a dealer's yard shall be deemed to have lost its railroad origin, and shall be classified and priced as steel scrap other than railroad scrap except in specified grades peculiar to railroad origin (listed in the schedule). For these listed grades the maximum shipping point and delivered prices shall be the same as those established for non-operating railroads for those grades. The maximum shipping point price of any grade of railroad cast iron scrap sold by a dealer shall be the same as that established for the railroad seller. "Unprepared scrap" shall have its customary trade meaning and shall not include such demolition projects as bridges or box cars which must be so priced that the prepared scrap will deliver to the consumer within the maximum delivered price established.

PREPARATION CHARGES: If unprepared scrap is purchased from an originating railroad, the consumer may designate a dealer to prepare such scrap on a preparation fee basis. The maximum preparation fee shall be the established differentials between the unprepared scrap and the listed grade for which the scrap is prepared. For example: $3.50 per gross ton for prepared No. 1 Railroad Heavy Melting Steel from Structural and/or Wrought Iron and Steel Uncut; or $2.50 for cutting rails 18-in. and under from Scrap Rails of Random Lengths; or $4.00 per ton for No. 2 Bundles prepared from No. 1 Sheet Scrap.

For cast, an in-transit preparation fee will be applicable only for preparing Cast Iron No. 3 into Cast Iron No. 1, for which the maximum preparation fee shall be $3.50 per gross ton. (Previous dealer fee was $2.50.)

MAXIMUM PRICE ON PREPARED SCRAP: The maximum delivered price for railroad scrap prepared in-transit shall be the maximum on-line price for the unprepared scrap, plus the applicable rail transportation charges incurred in moving scrap to dealer's yard, plus the applicable preparation fee, plus transportation charges from the dealer's yard to point of delivery.

Cast Iron Scrap

Maximum on-line price, per gross ton, for any of the following cast grades will be the price shown at the highest priced zone in which the railroad operates or is located.

	Per Gross Ton		
	Zone A	Zone B	Zone C
Cast Iron, No. 1	$18.00	$19.00	$20.00
Cast Iron, No. 2	17.00	18.00	19.00
Cast Iron, No. 3	14.50	15.50	16.50
Cast Iron, No. 4	13.25	14.25	15.25
Cast Iron Brake Shoes	13.25	14.25	15.25
Malleable	20.00	21.00	22.00
Wheels, No. 1	18.00	19.00	20.00

Zone A includes Mont., Idaho, Wyo., Nev., Utah, Ariz., and N. M. Zone B includes N. D., S. D., Neb., Colo., Kan., Okla., Texas, and Fla. Zone C includes all states not named in zones A and B, and includes switching district of Kansas City, Kansas-Missouri.

CAST IRON GRADE DEFINITIONS: Cast Iron, No. 1—Cast iron scrap such as columns, pipe, plates and/or castings of miscellaneous nature, but free from stove plate, brake shoes, and/or burnt scrap. Must be cupola size not over 24 x 30 in. and no pieces to weigh more than 150 lb. Free of foreign material. No. 2—Cast iron scrap in pieces weighing over 150 lb. not more than 500 lb. and free from burnt cast. No. 3—Cast iron scrap in pieces over 500 lb., includes cylinders, driving wheel centers, and/or all other castings. Free from hammer blocks or bases. No. 4—Burnt cast iron scrap such as grate bars, stove parts, and/or miscellaneous burnt scrap. No. 5—Driving and/or car brake shoes of all types except composition filled. Malleable—Malleable parts of automobiles, railroad cars, and locomotives. No. 7—Wheels, No. 1, includes cast iron car and/or locomotive wheels.

Comparison of Prices . . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	April 25, 1944	April 18, 1944	Mar. 21, 1944	April 27, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	April 25, 1944	April 18, 1944	Mar. 14, 1944	April 20, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	25.11	25.11	25.11	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	31.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy.-comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$7.00	$6.50
Foundry coke, prompt	8.25	8.25	8.25	7.375
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 137-151.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
April 25, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)			3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England. Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill at $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	3.518	4.872[6]	5.018a	3.922	4.772	3.605	3.666	3.822	4.072	5.966	7.066	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.853	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00[4]	3.70	4.659[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.78[13]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar-Strip	Billets, Blooms and Slabs	Bars and Bar-Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35				.10c	$2.00		
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25c	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20				.40	8.00		
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25			.65	13.00		
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40			.65	13.00		
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

Base Quantities

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.70
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00
Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

Shell Steel

	Per Gross Ton
8 in. to 12 in.	$52.00
13 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.
Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $49 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	*Seamless Hot Rolled*	*Lap Weld, Hot Rolled*
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.16
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	....
	Base per 100 lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	$0.67	$0.85
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:
Base discount less case lots

	Per Cent Off List
⅛ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

⅛ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts

	Consumer
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets
(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	65 and 5

Cap and Set Screws

	Consumer Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	30
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....	.....
Brooklyn	*27.50*	*27.00*	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.50	25.00	24.50	29.50	.....
Cincinnati, Ohio	*25.11*	*24.61*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.63*	26.13	*27.13*	*26.63*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron and Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorous iron; high phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum power, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.

PRICES

REFRACTORIES
(F.o.b. Works)

	Per 1000
Fire Clay Brick	
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
	Per Net Ton
Chrome Brick	
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per L.b.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: .45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. of more. $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.
- Open Hearth $2.70
- Crucible $2.80
- Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5 ..... $1.10

Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.
- 2000 lb. to carload $1.20
- Under 2000 lb. 1.30

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
- Carload lots ..... 25c.
- 2000 lb. to carload ..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
- Carload lots ..... 58c.
- 2000 lb. to carload ..... 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis
- No. 1 ..... 87.5c.
- No. 6 ..... 60c.
- No. 79 ..... 45c.

Bortram, f.o.b. Niagara Falls
- Ton lots, per lb. ..... 45c.
- Less ton lots, per lb. ..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb contained Cb.
- 2000 lb. lots $2.25
- Under 2000 lb. lots $2.30

Ferrotitanium, 40%-45%, f.o.b. 0.10c. max. Niagara Falls, N. Y., ton lots, per lb. contained Ti... $1.23
- Less ton lots $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium $1.35
- Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload $142.50

Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton $53.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo ..... 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo ..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
- Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump, f.o.b. plant usual freight allowances, per lb. of alloy
- Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
- Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.75c.
- Ton lots ..... 9.25c.

This advertisement is one of a series which is appearing in national magazines and newspapers as Consolidated Vultee's contribution toward a clearer public understanding of transportation's role in the war, and its postwar opportunities and responsibilities.

4 days out—4 days back—and the weather be damned!

1. **"Tired? I'll say I am!** You'd know, if you'd ever flown a 200-mile-per-hour cargo plane in from the Orient for the Air Service Command." He was only 22 years old, this Liberator Express pilot. He'd just brought his ship in – the end of a round-trip run on the longest air-freight haul in the world. From India, 14,000 miles away, to Patterson Field, outside Dayton, Ohio!

2. **Day in, day out,** the huge, long-range Liberator Express transports roar down this Ohio runway and streak southward to Brazil's hump, then across to Africa, and on to the very fringe of Jap-held Burma. The boys who fly this shuttle run – in all kinds of weather – call it the 8-day "Pony Express," – 4 days out, 4 days back.

3. **Each Liberator Express** carries many tons of high-priority cargo – aircraft parts and supplies urgently needed by American airmen based halfway around the world. Magnetos, fuel pumps, jungle kits, propellers, starters, aircraft engines, radios, and other vital accessories. "It's a rugged run," the pilots say. "But our combat flyers are doing a terrific job out there – and how they need the stuff we take 'em!"

4. **Dramatic as the India run is,** it's only one of the ways in which we're solving the stupendous problem of supply for United States air bases the world over. Every day, thousands of tons of supplies are loaded into freight cars and trucks at huge Air Service Command warehouses scattered over the U.S.A. The furious tempo of Allied aerial warfare calls for miracles of transportation, not only by air, but over highway, by rail, and on the sea.

CONSOLIDATED VULTEE